

Southern Hog Growing

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FOREWORD

Hog production is an important part of the farming program on the farms of the South. For many years hogs have been produced in great numbers in this section. In recent years there has been a marked effort to improve hog farming practices in the South.

The thousands of teachers of vocational agriculture employed in the public schools of the South are playing a very important role in the movement to improve hog farming practices and to make the enterprise more profitable. The efforts of members of the Future Farmers of America and vocational agriculture classes for adult farmers are being felt. Through their hog growing projects they are pointing the way to better practices and more profitable swine farming. They are putting into use on their home farms the practices they learn through study while at school.

This book has been written primarily for the use of youth and adults enrolled in vocational agriculture classes in the South. It is hoped that it will serve as an aid to present and future farmers seeking factual information to guide them in setting up and carrying on better programs of hog farming on their home farms. It deals with the jobs and problems connected with the enterprise in the South.

It is generally recognized that there are many problems in hog farming that are peculiar to the South. Problems in feeding and parasite control are somewhat different from those in other sections of the nation. The very fact that the South has a different combination of crops suitable for hog feeding, sets it off as an area having special problems in the production of pork. This book deals specifically with problems peculiar to the South.

In developing the contents for this book, use was made of the factual information developed through experiments and studies made by agricultural colleges and experiment stations of the South. It is presented in a manner that should be easily understood by youth and adults enrolled in vocational agriculture classes. Technical terms have been avoided whenever possible.

There was no attempt in the preparation of this book to suggest practices or programs applicable to specific farms or

to the region as a whole. The purpose was to present factual material, so analyzed and interpreted, that it would give individual youth and adults a basis for developing sound programs and practices on their individual farms—regardless of the section of the South in which they are located.

The author of "Southern Hog Growing," Dr. C. C. Scarborough is well qualified through experience, study and guidance of recognized specialists in swine production to write on this subject. He holds a B.S. and M.S. Degree in Agricultural Education from the Alabama Polytechnic Institute, and a Master of Education and Doctor of Education Degree from the University of Illinois. He also did some advanced study at Ohio State University. While in high school, Dr. Scarborough studied vocational agriculture. After teaching vocational agriculture for five years, he served as district supervisor, subject matter specialist, FFA executive secretary and teacher trainer. He has held positions of leadership in two southern states—Alabama and North Carolina. Since 1952, he has been head of teacher training in agricultural education at the North Carolina State College.

Dr. Scarborough is very familiar with farming programs and practices in the South. His knowledge of southern agriculture and methods of teaching used by vocational agriculture instructors and his ability as a subject matter specialist make him well qualified to prepare a book for use of youth and adults enrolled in vocational agriculture classes.

In the preparation of the material for this book, Dr. Scarborough has had the counsel and guidance of Dr. H. A. Stewart, Assistant Director of Research, North Carolina Experiment Station, who is a recognized authority on swine production in the South.

It is the hope of the author and editor that this book will be helpful to those who study it and that through its use, improved practices and more profitable hog growing in the South will result.

M. D. MOBLEY, *Editor*

It is a time of change. Perhaps this is always the case. However, it does seem that major changes are taking place now more rapidly than ever before. Certainly, the farmer is faced with a rapidly changing situation. This means more problems calling for decision-making by the farmer.

The hog business is no exception to the rapidly changing farm situation. Almost everything about growing hogs is changing—even the breeds. The old established breeds have changed and new breeds have been developed. Of course there have been found new and better ways of feeding. The use of new drugs is helping control diseases and parasites.

Perhaps the major reason for such rapid changes in the hog business is the housewife. Her buying habits have made it necessary to produce pork to meet the market demands. The buyer at the meat market wants *lean meat*. Many studies have shown that the buyer will pay considerably more for lean cuts of pork. In fact, if the housewife cannot get the lean cuts of pork she will buy beef or some other meat.

This demand for lean cuts of pork has led to the development of the *MEAT-Type Hog*. This demands breeding for meat-type as well as proper feeding. These matters are given emphasis in this book.

Appreciation for assistance in the preparation of material for this book is due many people. Dr. M. D. Mobley, Editor, and Russell L. Guin, Publisher, have been encouraging, cooperative and helpful. The State supervisors of vocational agriculture in the South furnished many pictures. The secretaries of breed associations, officials of packing plants and trade publications all furnished pictures and other materials. The editors and others at the State Agricultural Experiment Stations in the South and other selected states were most cooperative.

Grateful acknowledgment is given to Byron L. Southwell, Georgia Coastal Plain Experiment Station, A. O. Duncan, University of Georgia, and the late John T. Wheeler, University of Georgia, for the splendid work they did on "Swine Production in the South" which formed the basis for the development of this book—"Southern Hog Growing."

Special appreciation is expressed to Professor J. K. Coggin, co-worker, friend and photographer for the many fine photos from his files.

Dr. H. A. Stewart, Assistant Director of Research, N. C. Experiment Station, gave much guidance in securing latest information. He has given considerable time to helping the author clarify interpretation of data and trends. Much credit is given Dr. Stewart in the preparation of this book, particularly in the newer developments presented. However, the author assumes responsibility for the final form in which these matters appear in the book.

C. C. SCARBOROUGH

July 1958
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SECTION I

GETTING INTO THE HOG BUSINESS

CHAPTER 1

Planning the Hog Program

Hogs are grown in nearly every community in the South. However, the way in which these hogs are grown varies greatly. In some areas the "razorbaek" can still be seen. On the other hand, some farmers still boast about how large their hog was at slaughter. Still others may brag about the number of cans of lard they got at hog-killing time.

These things do still happen down South. However, they are rapidly becoming history. Folks who grow hogs are learning that style changes in hogs as well as in many other things. Today and in the future, the hog to grow is the "Meat-Type Hog." This is a hog producing a large per cent of lean cuts. This is not really a matter of choice for the commereial hog grower. The housewife is not buying the pork with lots of fat—even at a lower price. She is buying lard in smaller quantities, if at all. Therefore, the farmers growing hogs for sale *must* produce the meat-type hog to stay in business. Even the farmer concerned with producing only the pork needed at home wants a high quality meat to eat.

Therefore, the first decision anyone must make about planning the hog business is to plan to produce a meat-type hog. The first part of this ehapter will be concerned with getting a clear understanding of what is meant by the meat-type hog. Then consideration will be given to the different types of hog business: (1) Purebred breeding, (2) Market hogs, (3) Feeder pigs, (4) Feeding out hogs, (5) Speciality business, such as cured hams or barbecue pigs.

MEAT-TYPE HOGS

The *Wall Street Journal*, as well as hog journals, farm magazines, paeker publications, and many other publications carry articles on "The Meat-Type Hog." Why all this interest?

For many years a familiar scene on the hog farms of the South was the short-bodied, fat, "guinea-type" hog. This hog was small-boned and easily fattened, soon becoming roly-poly. This

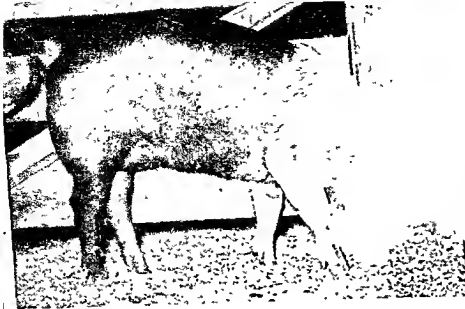


Fig. 1-1. A good meat-type hog. This is the type of hog to meet present demand for leaner meat. See the difference in this hog and the one of same age and weight in Figure 1-2. (Courtesy, Rath Packing Co.)



Fig. 1-2. A good hog but too short and fat to produce the lean meat for today's market. (Courtesy, Rath Packing Co.)

type of hog met an earlier demand for lard which was a major part of the reason for raising and slaughtering hogs. Needs have changed and so have hogs.

It is easy to tell the difference in a fat, chuffy hog, as described, and a meat-type hog. However, it is not so easy to distinguish the lean-meat hog from the hog that is only "lean." Every hog grower must learn how to judge a meat-type hog.

What Is a Meat-Type Hog? For many years hogs were of two types: (1) Bacon type, or (2) Lard type. Nearly all of the hogs in the South were of the lard type. In fact, any hog not showing considerable fat was a scrub or at least a poorly finished animal.

A meat-type hog is not a bacon or lard-type hog. Neither is the meat-type hog a combination of the two types. The meat-type hog is a new idea and its conformation is entirely different from that of bacon or lard-type hogs.



Fig. 1-3. This Kentucky Future Farmer's meat-type hog has just been declared the Grand Champion of the hog show. (Courtesy, Kentucky FFA Association)

The meat-type hog is based upon a high yield of lean pork. This lean pork is in the desirable cuts of ham, loin, picnic, and butts. This is where the lean meat pays off when the housewife goes to market.

The key to the production of this lean meat, however, is more than the absence of fat. For example, a farmer can keep a hog lean by reducing feed, but he cannot produce the desirable lean meat. The key is in *muscle development*. This depends upon the breeding in the hog. The meat-type hog retains the lean meat even when gaining rapidly while reaching 200 pounds.

Judging for Meat-Type: Perhaps the first thing that a person must do in learning to judge a meat-type hog is to forget what he has learned in judging hogs in the show ring! "We need to get away from judging frills and fancies," says Guy F. McReynolds, chairman of the national Hampshire-type committee, in *The Progressive Farmer*. "What we are after is red meat." This is an important point. Farmers, packers, dealers and every-

one in the hog business are trying to learn more about meat-type hogs.

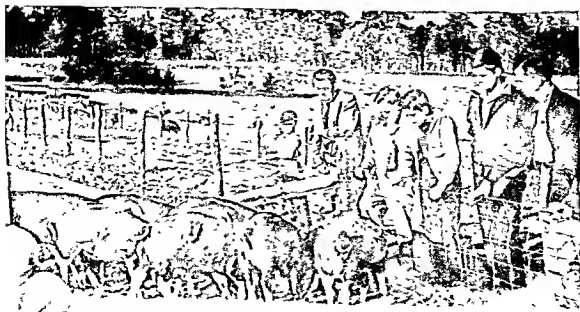
Key to Meat-Type Hog: Avoiding the overly-fat hog as well as the overly-lean "meatless" hog, still leaves the hog grower without specific help in determining the characteristics of the best meat-type hog.

The two major factors in a meat-type hog are: (1) Back-fat thickness, and (2) Back length. That is, the combination of a long back and small thickness of back-fat is the key to the production of a large per cent of lean meat. This simply means that a highly desirable meat-type hog will yield 50% of the carcass trimmed loin, ham, picnic and butt. That is why a longer, leaner, hog with less back-fat is needed.

Measuring Back-Fat Thickness: There are several ways of measuring back-fat thickness in live animals. Although these methods have proven fairly satisfactory, much more accurate than judging, research continues. The USDA has reported that recent studies on determination of fat by putting the animal to sleep may prove very valuable.

Meat-Type Hogs Economical: Not only are meat-type hogs producing the pork now in demand, but they are doing so economically. Studies at several experiment stations have shown that meat-type pigs require less feed per 100 pounds of pork and gain as rapidly as any other pigs. Furthermore, they produce much more meat per unit of feed than any other type.

Fig. 1-4. Florida Future Farmers look over their Beltsville No. 1 gilts owned by their chapter. These gilts are from one of the new breeds developed to produce meat-type hogs. (Courtesy, Florida FFA)



Which Breed of Hogs Is Best Meat-Type? No one breed of hogs can claim to be *"the"* meat-type hog. There is meat-type in many different breeds. Some of the newer breeds have been developed specifically toward producing only meat-type hogs. Apparently, some of the breeders of old established breeds have given much attention to breeding meat-type hogs. Leaders agree that there may be more difference in animals within a breed than among breeds.

Much has been said about crossbreds being desirable meat-type hogs. This depends entirely upon the animals used in the cross. It is true that crossbreds have a number of advantages, but these would not be for better meat-type hogs unless the cross was carefully chosen for this purpose.

Do Meat-Type Hogs Bring Better Price? The lack of a difference in price for the better grade, meat-type hog has been one of the major problems in many of the markets in the South. However, reports indicate that buyers all over the South, and elsewhere, are paying premium prices for the better hogs. This is done by grading the animals more carefully, paying premium



Fig. 1-5. Growing hogs is this Future Farmer's business. He must be good at other farming, too. Making decisions is his biggest job. He is talking over things with his vo-ag teacher. (Photo by J. K. Coggin)

prices for the better grades, while docking the seller for his over-lardy hogs.

How to Get Started in Meat-Type Hogs: Many farmers must "grow" into the business of producing meat-type hogs. This can be done in several ways. If the use of a good meat-type boar can be secured, this of course, is the first step toward producing meat-type hogs. Replacing sows or adding to the herd by securing long-bodied meat-type gilts is another method of producing meat-type hogs.

If the farmer can make the change more rapidly, bred sows should be considered. Buying open gilts of the most desirable meat-type may be an economical method of getting into the production of meat-type hogs if a good boar is available for breeding.

Selection is a most important step toward producing meat-type hogs. Even if the selection is from the home herd, careful selection is needed. In addition to a long-bodied, healthy, vigorous individual, the animal selected should be from a litter of 10 or more healthy, uniform pigs.

DECIDING UPON THE BEST TYPE OF HOG BUSINESS

There is a "best" type of hog business for any one farm. It is a problem of deciding which fits best into the total situation on a farm. Here are some of the more important factors to be considered.

1. It is a time of change. The hog business is no exception. The first factor then is the farmer himself. Can



Fig. 1-6. Year-round grazing is one of the advantages of growing hogs in the South. A North Carolina vo-ag teacher shows a Future Farmer and his father how to take soil samples to determine what is needed to produce a good pasture. (Photo by J. K. Coggin)



Fig. 1-7. Growing corn is part of growing hogs. This Future Farmer shows that good corn can be grown down South. (Photo by J. K. Coggin)

he change to meet the demands for a meat-type hog? Someone has said "We can change the hog easier than we can change the man who grows the hog." He must have interest, knowledge and skill.

2. Will growing hogs fit into the present farming situation? If not, can the needed changes be made economically? Can enough hogs be grown to make an economical unit?
3. A supply of home-grown corn, produced economically is important.
4. Provision for year-round grazing. This is one of the big advantages in the South, overlooked by many hog farmers.
5. Market situation in the vicinity. The basis for marketing purebred and all other hogs is perhaps the availability of permanent, dependable marketing facilities. It is important that at least some of these markets use official grades as a basis for prices paid.
6. Type of hog businesses already established in the community. This might indicate either more need or an over-supply of a particular type of hog business.

These are some of the factors that anyone considering going into any phase of the hog business must take into account. Further suggestions in each of the major phases of the hog business will be given.

One other major consideration is that of size of the hog business. As stated, the hogs must fit into the present situation or necessary adjustments should be made. However, as a money-making enterprise, in raising pigs from sows, a herd of five sows is usually considered a minimum commercial herd. Anything smaller would be considered a supplementary enterprise.



Fig. 1-8. Purebred hog business demands special abilities but is an important part of hog enterprise. (Courtesy, Jack Hubbard, Route 4, Fayetteville, N. C.)

Purebred Hog Business: Although purebreds are often considered the "best" phase of the business, it is one that many farmers must avoid. It takes all the skills of growing hogs in any other way, as well as more investment in the enterprise. Yet, it is a rewarding business for the man who has "the eye of a successful breeder."

The purebred is the basis of the hog business. Since the use of crossbreds, some do not feel that the purebreds are important as before. This is not the case. Crossbreds are dependent upon purebreds for making dependable crosses of individuals.

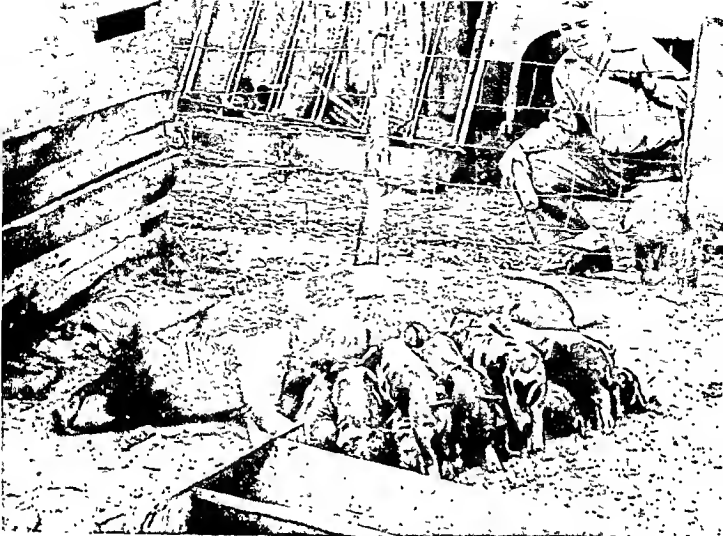


Fig. 1-9. A fine boy with a good sow and a nice litter of pigs. However, he may be in for trouble with disease and parasites if he does not get them away from the old hog lot. (Photo by J. K. Coggin)

It would be a sound recommendation to say that ordinarily a person considering the purebred hog business should first grow out hogs for market, if he has not had previous experience in growing hogs.

Producing Market Hogs: Professor H. A. Stewart, Assistant Director of North Carolina Experiment Station, says that a successful market hog production program can increase cash returns if careful attention is given to—

1. *Disease control.* If disease hits, the producer may be out of business, even if all other phases of the operation are successful. In spite of its importance, many producers give more attention to feeding, equipment, and breeds than to sanitation and disease control.
2. *Prolific, good-milking sows.* A large number of pigs must be farrowed alive, and a large percentage of

these must survive if producing market hogs is to be successful.

3. *Efficient use of feed.* It is estimated that 80 per cent of the cost of producing a pound of pork goes for feed. Yet some farmers use much more feed than others to market the same amount of pork.
4. *Production of heavy-muscled meat-type hogs.* The producer must market a product the housewife wants to buy. Research has shown that great differences exist between groups of hogs in producing these desired lean meat cuts. External conformation does not reflect backfat thickness and extent of muscling.

Professor Stewart, with years of experience in research in the hog business, recognizing the present problems, and with an eye to the future, says that to be successful in the business of pork production, a farmer must do the following:

1. Do a better job on sanitation and disease control.
2. Raise and market more pigs per sow than we are at present. A program of crossbreeding, as well as pig brooders and farrowing crates, will help.
3. Keep records of sow productivity and post-weaning performance of pigs to aid in objective selections of replacements in both purebred and commercial herds.
4. Watch the grain and feed supply as we watch the performance of both the breeding herd and the feeders, while we keep an eye on the daily market reports on hog prices. Cull continuously.
5. Use a carefully selected meat-type purebred boar of the meatier, faster growing gilts.
6. Top out the butchers as they reach 200-220 pounds. As they get heavier, the quality of carcass, as well as feed efficiency, decreases.

Growing Out Feeder Pigs: Many southern farmers have made money selling feeder pigs. These pigs are sold usually at 75-100 pounds. In some sections of the South, the practice is to sell pigs at even lighter weights.

Feeder pigs are sold in several different ways, depending upon the locality. Small numbers are sold to trucker-buyers right

on the farm. Larger lots of pigs may be sold in advance to feeders by contract.

The secret of success in the pig feeder business seems to be in keeping close check on the demand in the vicinity and being able to meet it. On the farm the successful grower of feeder pigs must produce his own pasture and feed, keep the sows producing large litters, and keep pig losses to a minimum.

It would be well, if the farm situation permits, to develop plans to make possible an alternate plan of feeding the pigs to "tops" of 200 pounds, if prices for feeder pigs are unfavorable.



Fig. 1-10. This Future Farmer is trying to decide if it is time to market these hogs he has been feeding out. Note that he has been checking his record book with his vo-agg teacher. (Photo by J. K. Coggin)

Feeding Out Hogs: In this phase of the hog business, the producer concentrates in feeding out pigs into market hogs. He leaves the problems of breeding, farrowing and raising pigs to someone else. He looks for healthy, vigorous, fast-growing pigs. The feeder buys pigs from weaning age up to about 100 pounds.

The person interested in this phase of the hog business should have a supply of corn and other feed, or be able to secure quantities of feed at bargain rates. Sometimes, this may be feed mill waste or other grain products. In some sections the feeding of garbage is a common practice. Before any waste products are fed, close check should be made on any regulations on feeding hogs such products.

Speciality Hog Business: Many hog farmers, and some others as well, in the South have built a good business around a speciality. Hams and barbecue are perhaps the two most common, with sausage and other products also popular in some sections.

The secret here is ability in the area, curing ham, for example, and "good business sense" particularly in advertising and public relations. The wife of a governor of one southern state has produced and sold profitably cured hams throughout the country. "Virginia Ham" and "Smithfield Ham" have natural appeal to plenty of buyers. If a good product can be produced, it can usually be sold at a profit.

The young hog grower would do well to consider developing a speciality as a sideline to his regular hog business.

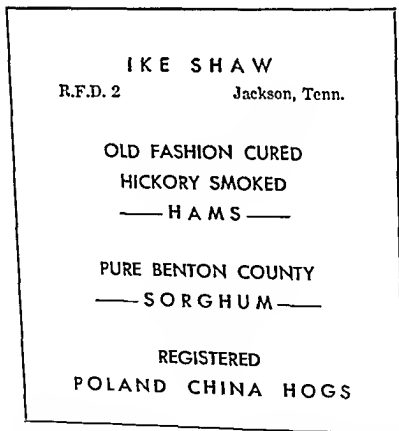


Fig. 1-11. An example of a speciality developed in connection with other hog business. This takes "an eye for business" as well as excellent products. (Courtesy, Ike Shaw, Jackson, Tenn.)



Fig. 1-12. The vocational agriculture class is the place where boys in the South learn about the importance of hogs. Studying latest research, comparing with home farm situation, discussing problems under guidance of the vo-ag teacher give a good basis for making sound decisions about growing hogs. (Photo by J. K. Coggin)

SUMMARY

Hogs are grown all over the South. However, many farmers do not grow good hogs efficiently.

The big demand is for the "Meat-Type Hog." The housewives of this country are not buying fat meat and lard.

A long, lanky, thin hog may not be a meat-type hog. It takes the proper breeding for a well-fed hog to still retain maximum of lean meat cuts.

A young hog farmer might do well to add a "speciality," such as cured hams, as a sideline to his hog business. Interest and a desire to keep learning seem essential to success in any speciality.

The size of the hog business must be large enough to be an efficient enterprise. If the business is too small, it may not be profitable even if an excellent job of management is done. If pigs are to be raised from sows, the minimum number for a commercial herd is usually five sows.

The "Hog Business" includes many different things. There is much difference in the purebred business and growing out market hogs.

To succeed in any phase of hog business calls for knowledge and understanding of the problems involved in each phase of the business.

PROBLEMS AND ACTIVITIES

1. What are the different types of hog businesses in operation in your community?
2. Visit one of each type of hog business in the community.
3. Outline the major points of difference in growing hogs in the community.
4. What type of hog program is on your home farm?
5. How can the present hog program be improved on the home farm?
6. Can any needed changes be made without cost? Estimate cost of each change in the home farm hog program.
7. What is meant by a "Meat-Type Hog?" What breed is it?
8. How can you determine if it is a meat-type hog?

CHAPTER 2

The Importance of Hogs in the South

It is a well established principle of nutrition that meat is one of the essential foods in a well rounded diet of every human being. In other words, an individual to be healthy needs meat continuously as a part of his diet. From the application of this general principle grows the demand for meat and its products throughout the world; and, in turn, out of this demand for an essential food, grows the agricultural importance of meat production in general and pork production in particular as far as the emphasis in this book is concerned.

Since the book deals only with the problems of producing pork, the question naturally arises, what is the place and importance of pork in supplying the dietary demands for meat? To answer this question, two factors will be examined: (1) the demand for pork in relation to other and all meats; and (2) the distribution of hogs on farms in the South.

Pork Demand: The constancy of American demand for pork and its products can best be measured by the per capita consumption of these products in the United States over an extended period of time.

Table 1 shows the total per capita consumption of meat in the United States, together with the per capita consumption of pork, lard and other meats.

It can be seen by a study of Chart I and Table 1 that the production and consumption of meat is at an all-time high. The production has followed strong consumer demand for meat as well as being a good source of income on the farm. Feed for livestock has been more plentiful in recent years too. These and other reasons account for the continual increase in production of livestock. It cannot be over-emphasized that the important key to all this increased production, is increased consumption. Not only the amount of meat eaten is important to the livestock man, but the type of meat preferred by the consumers. In a later chapter this matter of preference by the housewife as she goes to market will be discussed more in detail. How these matters affect the type of hogs grown and sold is well illustrated by a

statement by Harold F. Breimyer of the Agricultural Economics Division, U.S.D.A. which follows.

"One trend in demand over many years has been a turning away from pork toward beef. This has reflected in part consumers' growing dislike for the fatter cuts of pork. Another cause of loss of demand for pork is the shift of population from pork-eating areas (the South and all farming areas) to beef-eating areas. Still another is increased use of refrigeration in frozen food lockers and home freezers, which has aided demand for beef more than that for pork."

It can be noted that the amount of pork and lard consumed per person has been about the same through the years. Although the amount of pork and lard consumed has not increased at the rapid rate of beef, the consumption has been steady and the outlook is good. This is particularly true if the hog growers will produce the type of meat desired, as indicated by the foregoing statement by Mr. Breimyer. Considerable attention will be given this matter in Chapter 14—Selecting Breeding Stock.

Table 1. Pounds of Meat Consumed Per Person in United States in Recent Years.¹

Year	Total Meat	Pork ²	Lard ²	Beef and Veal	Lamb and Mutton
1939	132	64	13	61	6
1940	140	72	14	62	7
1941	142	67	14	68	7
1942	138	63	13	69	7
1943	145	78	14	61	6
1944	152	79	14	67	7
1945	143	66	12	70	7
1946	152	75	12	71	7
1947	153	69	13	79	5
1948	144	67	13	72	5
1949	143	67	13	72	4
1950	143	68	14	71	4
1951	136	71	14	62	3
1952	144	72	13	69	4
1953	154	63	13	86	5
1954 ³	153	60	11	89	4
1955 ⁴	161				

Agricultural Statistics 1955

¹Figures are rounded to nearest whole number

²Exclusive of lard

³Includes lard in manufacturing products

⁴Preliminary

⁵Special report

Fig. 2-1.

Chart I.

Pork and Beef Increase as Meat Output Sets New Record in 1955

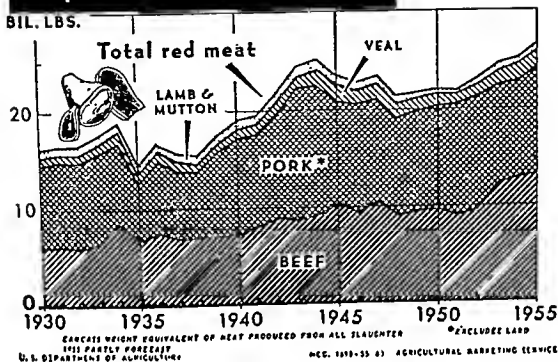


Fig. 2-2. Output of red meat is the largest in history. However, it can be seen that pork has not increased as much as beef.

Table 2. Number of Hogs, including Pigs, on Farms and Value by Areas January 1, 1944-53, Annual 1954 and 1955.

Area	Number			Farm Value		
	Average 1944-53	1954	1955	Value per head		Total Value
				Average 1944-53	1954 1955	Average 1944-53 1954 1955
	thousand			dollars		thousand dollars
United States	61,166	48,560	55,002	29.60	36.70 30.60	1,770,791 1,780,835 1,684,116
The South	14,960	10,154	11,159	20.95	25.75 22.65	307,037 261,820 252,368
North Central	42,607	36,222	41,426	32.80	40.00 32.90	1,366,731 1,448,270 1,363,829
North Atlantic	1,383	998	1,070	27.50	31.60 28.50	36,936 31,586 30,475
The West	2,215	1,186	1,347	28.70	33.00 27.80	60,087 39,159 37,444

Agricultural Statistics 1955

Fig. 2-3.

Importance of Hogs in the South: Because of great fluctuations in our export trade during the past three decades, farmers are faced with the necessity of continuously adjusting their hog production programs to national demands. Consequently, the number of hogs has varied from year to year. This has been



Fig. 2-4. Hog growing down South! A vo-ag teacher visits a young farmer who is increasing quality as well as quantity of pork produced on his farm. (Photo by J. K. Coggin)

particularly noticeable in war years. Better production of better hogs makes it possible to produce the same amount of meat with fewer hogs.

Perhaps more important than the total number of hogs, is the distribution. It can be seen in Table 3 that the southern

Table 3. Farms Reporting Hogs and Pigs, including Value, by Areas
1950, 1945

Area	Per Cent of All Farms ¹		Value	
	1950	1945	1950	1945
United States	56	57	\$1,097,702,000	\$988,104,000
South Atlantic	66	64	77,325,000	65,089,000
E. South Central	66	63	73,147,000	52,428,000
W. South Central	53	56	48,368,000	55,914,000
New England	16	22	4,090,000	4,180,000
Middle Atlantic	31	41	21,739,000	22,802,000
E. North Central	56	57	328,764,000	264,213,000
W. North Central	65	67	510,636,000	484,573,000
Mountain	37	43	16,248,000	18,884,000
Pacific	18	21	17,386,000	20,020,000

U. S. Census 1950

¹Numbers in table rounded to nearest whole number.

Fig. 2-5.

farms still have a very high percentage of farms growing hogs, even though the North Central States have the largest number of hogs. This means that there are more farmers with fewer hogs in the South than in some other areas. Therefore, more farm families in the South will need to do a good job of growing hogs.



Fig. 2-6. Hogs are important all over the South. This Texas Future Farmer raised the Grand Champion Barrow over all breeds at the San Antonio Livestock Exposition. (Courtesy, Texas FFA)

Hog Production and Feeds: There are several reasons why hogs have found a favorable and permanent place in the farming of the South. In the first place, hog raising follows the areas where feeds suitable for hogs are most abundant. The growing of corn, small grains, peanuts, soybeans, sweet potatoes, sorghum, and other grazing crops, paves the way for growing hogs economically in the South. Of course, the several states

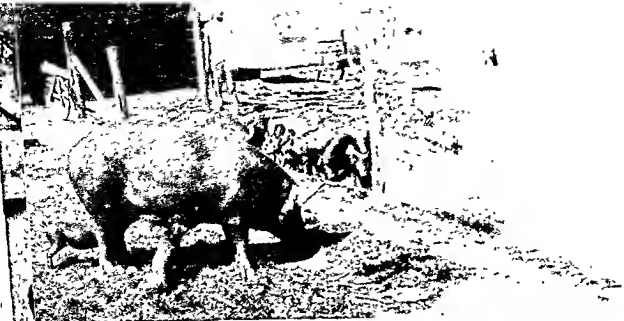


Fig. 2-7. This Georgia farmer is producing meat-type hogs with the Tamworth breed. Notice the farrowing house and the divided fields for green grazing. (Courtesy, J. S. Davis, Alelea, Ga.)

of the South are by no means uniform in the crops each grows, still every southern state has a comparatively wide range of feed crops that lend themselves admirably to developing excellent swine production programs. The very fact that the South has several different crops and combination of crops suitable for hog feeding, sets it off as an area having unique possibilities for the production of pork.

It should be further pointed out that every state in the South has greatly expanded its feed production during the immediate past, and it is inevitable that, as feed production expands, pork production will also expand.

Farm Income from Hogs: In the proportion that feeds are abundant, to that extent hogs may become a major source of farm income on the individual farm or in the region.

It can be seen in Table 4 that the big income from hogs in this country is in the North Central States—the Corn Belt. However, it should be noted that the more than 600 million dollar income from hogs in the South is distributed over about two-thirds of all the farms in the South. This does not include sales from one farm to the other, which is a very common way of selling hogs in some sections of the South.

As will be noted more in detail later, the South has many advantages in growing hogs, particularly in being able to have pastures for hogs in every month of the year. It would appear that even more than two-thirds of the farms might profitably grow hogs. Apparently, the successful hog grower of the future is going to produce better hogs more economically.

For the small farmer, hogs seem to be one of the best livestock enterprises for him to consider adding to his farming program. Some who have a few hogs need to practice better management, perhaps increasing the numbers. Certainly, growing hogs is important in the South.

Table 4. Hogs Marketed and Gross Income by Areas.

<i>Area</i>	<i>Marketing¹</i>	<i>Gross Income²</i>
	<i>head</i>	<i>dollars</i>
United States	69,360,000	3,982,754,000
The South	9,463,000	663,140,000
North Atlantic	991,000	72,258,000
North Central	57,531,000	3,216,586,000
The West	1,375,000	88,301,000

Agricultural Statistics 1955

¹Does not include interfarm sales

²Cash receipts plus value of hogs slaughtered for home consumption

Fig. 2-8.

Hogs for Home Supply: Besides fitting into the farming of the South, as a source of farm income, hogs furnish the main source of meat supply for the farm population. While it is generally accepted as good economy, that the farm should provide the meat supply for those living on the land, still it appears that this practice is inadequately carried out in the South. From recent reports of the United States Census of Agriculture, it appears that nearly one-third of the farm families were without hogs at the time the census was taken in 1950.

The importance of the southern region as a hog producing area is well established in our national economy, and this region is growing in relative importance in this respect, but there is still a large place in the farming of the South for expanding hog production by growing hogs for one-third of the farm families to provide a more adequate meat supply for its farming population.

Markets for Pork: Of course, the ultimate purpose of producing pork is to provide food for the tables of the nation. These tables are spread over the land in direct ratios to the density of the population.

Most of the great pork consuming centers to which farm meat that is sold for cash must move, are far removed from

southern farms. Therefore, in determining the importance of hog production in the South as a means of cash income, the local facilities for placing pork and its products into the wider channels of trade should be considered.

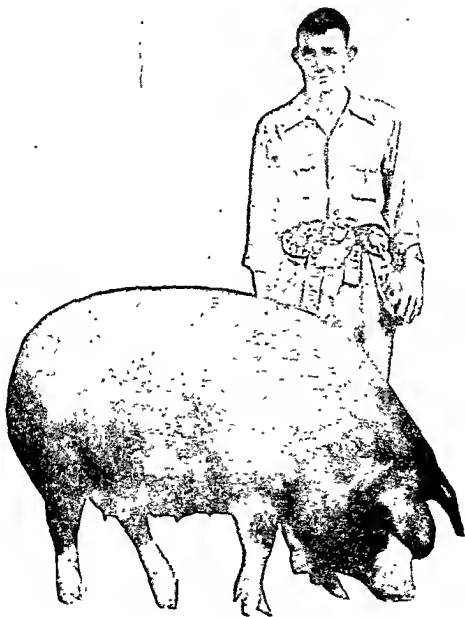


Fig. 2-9. This Louisiana Future Farmer has won many prizes with his champion sow. (Courtesy, Louisiana FFA)

In Chapter 10 the problem of marketing hogs is considered in detail, but it seems pertinent to point here to the fact that the South has developed marketing facilities so that its pork can be put into the channels of trade and can be moved to the tables of the large population centers of the nation.

The Problem of the Individual Farmer: This Chapter is not written to stimulate hog growing in the South. The facts here presented are to give a true picture of the situation as it exists. The individual farmer must decide to what extent his farm is adapted to the production of hogs.

SUMMARY

In this chapter the importance of hogs in the South was considered mainly under two headings: (1) The demand for meat, including pork, and (2) The distribution of hogs on farms in the South.

The demand on the part of consumers for meat is the highest in the history of our country. There was more meat eaten per person in the U.S. in 1955 than ever before. Over the years, pork has supplied about one-half of the meat eaten per person. In recent years pork has not increased as rapidly as beef. However, consumption of pork has been steady. Whether pork will continue to rise in the amount consumed seems to depend upon the type of pork produced. Apparently the housewife wants to buy more lean meat and less fat in the pork products.

It was concluded that growing hogs in the South is important, although in a different way from that of the Corn Belt—the largest hog producing area. In the South about two-thirds of all farms grow hogs, making it important to those families.

PROBLEMS AND ACTIVITIES

1. Study the distribution of hog enterprise using U.S.D.A. Agricultural Statistics:
 - (a) How many hogs are there on farms in your state as of January 1, last?
 - (b) How many hogs on farms of the states bordering your state?
2. Explain the variation of distribution of hogs from state to state and from one section of the country to another.

3. Look up the hog population of your state for a period of 30 years. How does the population change? Draw a graph showing these changes. Can you account for these changes? In what year did your state have the largest hog population?
4. Where and how do farmers sell hogs in your community?
5. Ask your vo-ag teacher about visiting a hog buyer to learn where he sells the hogs.
6. How would you determine whether your farm is adapted to hog production? For home use? For market?
7. Calculate the amount of pork needed for your family. Is enough now being produced on your farm according to your calculations?
8. Write your State Agricultural College for information on importance of hogs in your state.

SECTION II

MANAGING HOGS

CHAPTER 3

Understanding Hog Feeding

Feed is one of the most expensive items in hog production. The cost of feed represents about 80% of the total cost of producing pork. When it is wasted or fed as an unbalanced ration, the feed cost often makes the enterprise unprofitable. An unbalanced ration results in less gain which brings reduced profits. There is, therefore, a need for setting up a good feeding program for hogs in order to get maximum returns. It is necessary that one produce as much pork with as little feed as possible in a short time to get the greatest return per dollar of feed cost.

Every farmer who grows hogs for market or for home consumption is confronted with certain jobs in feeding, such as feeding for slaughtering purposes, feeding breeding hogs, and feeding the sow and litter. Success in hog farming depends in a large measure upon the solution of these problems. There are few, if any, jobs connected with the enterprise that are more important than those in feeding.

It is the purpose of this chapter to give—(1) an understanding of the importance of an adequate feeding program for hogs, (2) some principles of animal nutrition, and (3) a general knowledge of the different kinds of feeds as a basis for developing a feeding program for hogs. Specific information dealing with feeds and feeding practices for hogs to be marketed and slaughtered, is contained in Chapter 9 and for breeding hogs in Chapter 15.

I. IMPORTANCE OF A GOOD FEEDING PROGRAM FOR HOGS

It is important to plan an adequate feeding program for hogs. The kind of practices that a farmer develops and carries out has a decided effect upon the growth or gain of hogs, the feed cost in swine production, and the net returns from the enterprise.

Effect of Feeding on Growth or Gain: Feeding experiments show that hogs fed an unbalanced ration make an average gain per hog as low as one-half pound per day, while those that are given a ration balanced in nutrients make a daily gain of as much

as one and one-half pounds per day. There are hogs in every southern community that require from twelve to fourteen months to reach a weight of 200 pounds. They can be made to reach 200 pounds in less than six months time when good feeding practices are used.



Fig. 3-1. Are these hogs gaining as they should? This young farmer thinks so. He understands what it takes to make a good ration for growing hogs. (Photo by J. K. Coggin)

What is Meant by a Balanced Ration? A balanced ration is defined as furnishing all the food nutrients necessary to properly nourish an animal or group of animals. However, in practice this would not be any one ration, but would vary with age and weight of hog.

It can be seen in Table 5 that the extra cost of supplement can be expected to prove profitable in the case of brood sows and fattening pigs. To determine the exact cost of this extra supplement, local cost figures should be used in calculating costs and gains for the figures used in the table. Students in vocational agriculture classes frequently conduct a demonstration of the

Table 5. Value of Supplement in Feeding Brood Sows and Fattening Pigs.*

Brood Sows		
	<i>Corn Alone</i>	<i>Corn and Balanced Supplement</i>
Birth Weight of Pigs (lbs.)	1.85	2.42
Per cent of strong pigs	41	85
Total gain on sow and litter (lbs.)	82	167
Feed per 100 lbs. of gain (lbs.)	754	359
Fattening Pigs		
Daily gain, lbs.	0.5	1.8
Grain per 100 pounds of gain, lbs.	672	308
Balanced Supplement, lbs.		45
Total Feed, lbs.	672	353

*Combined data from Iowa Exp. Sta.

Fig. 3-2.

need for supplement by securing two pigs from the same litter weighing the same, feeding one pig corn alone while the other receives a balanced feed. Accurate records on such projects can then be used in planning the feeding program with other hog projects.

Effect of Cost of Feed on Production: Some feeds cost more than others; and some require more labor in growing and harvesting than others. This means that a swine producer to be successful must carefully consider the cost of feed to be bought or grown. The cheapest feed is not necessarily the most profitable. The feeds and feeding program that will give the greatest net returns on a given farm are the ones to use. These can be determined through study.

Kinds of Feed Needed by Hogs: The pig's rapid growth as well as the small digestive tract makes it necessary to have highly concentrated feeds. Hogs cannot use as much roughage as other animals. The capacity of the stomach of different animals may be compared by noting the following averages:

Hog	8 quarts
Horse	19 quarts
Sheep	31 quarts
Cow	266 quarts

Hogs are good grazers and pastures are needed, as will be indicated later in the chapter. However, it can be seen that much of the hog's ration must be of the high energy, concentrated type of feed, such as corn.

Amount of Feed Required: Details of feeding market hogs will be discussed in a later chapter. However, to understand hog feeding it is necessary to know something of the total feed required and the type of feed at different stages of growth.

Table 6. Feed Required to Produce a 225 Pound Market Hog.*

<i>Stage of Growth</i>	<i>Grain lbs.</i>	<i>Protein Suppl.</i>	<i>Minerals lbs.</i>	<i>Total Feed lbs.</i>
Sow (gestation)	754	40	3	797
Farrowing to Weaning (sow and 8 pigs)	763	35	7	855
Total	1,517	125	10	1,652
Per Pig				
Breeding to Weaning	190	16	2	208
30 to 75 lbs.	114	20	1	135
75 to 150 lbs.	220	26	1	247
150 to 225 lbs.	264	24	1	289
Total Feed Per Pig	788	86	5	879

*On Ladino Clover Pasture. N. C. Ext. Circ. 238

Fig. 3-3.

Table 6, on the amount of feed required, can be used as a yardstick for measuring efficiency in growing hogs. As indicated in the footnote to the table, good pasture will be necessary to get the results as given in the table. Where good green pasture is not available the feed requirements will be more than the amounts listed in Table 6. The green grazing is especially important for the sow during gestation and while suckling, and for the pigs until they are about three months old.

Important as feeding is, it cannot accomplish everything. Other management factors are important as well as the necessity of having good animals. If, after following good feed practices, a hog grower still cannot produce market hogs about as well as indicated in Table 6, he should check other factors. This check should include his breeding stock and sanitation. Quality hogs and control of parasites and diseases are important factors in the efficient utilization of feed.

Since the practices used in feeding have an important effect upon the daily gain, and consequently, the net returns from hogs, one can readily see the importance of each grower developing and putting into operation a sound feeding program for his hogs. Profitable pork production is directly dependent upon an adequate feeding program.

Feeding is a major problem in the total management of hogs. It is closely related to the time of marketing which in turn depends upon date of birth. All of these are tied together and feed may be the key factor.

II. ANIMAL NUTRITION

"Don't be a pig!" "Eat like a hog!" Such common sayings indicate that hogs like to eat, and lots of it too. That is generally true, but a pig grows better on a balanced ration just the same as a calf, a dog, or a boy. Hogs require feed for two purposes: (1) for maintenance of body and (2) for growth.

Feeds that are taken into the body undergo many chemical changes. They are finally converted into substances that can be assimilated by the animal, to be used in meeting maintenance and building requirements. For example, when corn is consumed by hogs, the cellulose and starch are converted into sugar and the sugar into a substance that is readily used by the animal.

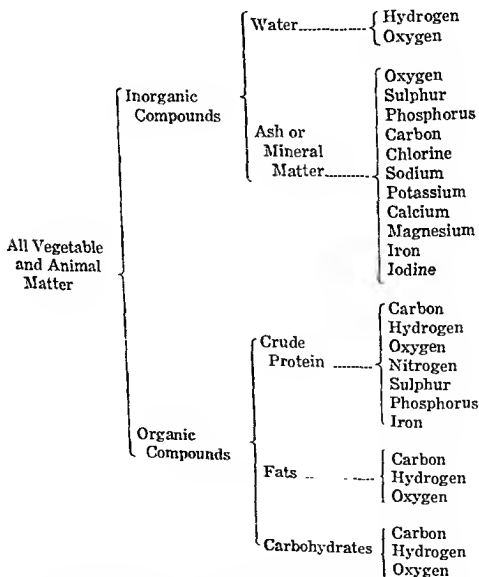
Some feeds are more easily digested than others. Cellulose is difficult to digest while starch and sugars are more easily digested. The kinds and amounts of different feeds needed by animals for maintenance are different from those for growth and fattening.

As farm animals are generally fed, about one-half of the food eaten is used to maintain life so that the body will not lose any of its stored nutrients. The feed consumed above a maintenance ration is all that can be counted on for the production of lean and fat meat. In the case of hogs one is primarily concerned about the use of feed for growth and body building. The per cent of consumed feed necessary for maintenance alone for hogs is somewhat less than for some of the other farm animals.

There are two ways of determining the amount of each food nutrient needed for maintenance and growth of hogs. The most practical way is by feeding different kinds and amounts of feeds and noting the effects on the animal. Chemical studies of the

different nutrient needs of animals and chemical analyses of different feeds are made and often used as a basis for working out a balanced ration. The former method is used largely by experiment stations. It is the most practical and should be used whenever possible.

COMPOSITION OF FEEDS*



*Table adapted from Bull and Carroll, Principles of Feeding Farm Animals, Interstate Printing Company, Danville, Illinois.

Fig. 3-4.

III. KIND OF FEEDS AND THEIR FUNCTIONS

As has been indicated, feeds differ in their chemical composition and their functions in the growth of animals. It is the purpose here to give a basic understanding of food nutrients and something of their uses in the feeding program for hogs.

Carbohydrates: Carbohydrates are compounds of carbon, hydrogen, and oxygen with the ratio of hydrogen to oxygen the same as that for water (two hydrogens to one oxygen). Some examples of useful carbohydrates in swine nutrition are: corn, small grains, seeds of legumes, tubers such as potatoes, and fibrous portions of certain plants. The carbohydrates include very complex compounds such as cellulose, the less complex compounds such as starch, and the readily digestible compound such as sugars.

Carbohydrates are primarily *energy and fat producing nutrients*. The sun is the source of all energy. This energy reaches the earth in the form of light and heat. Plants have the power to get the energy directly from light and heat. For example, a corn plant, by a process known as photosynthesis, is able to secure energy for its own growth and also an excess amount which is stored in the seeds, wood fibers, and other parts of the plant.

In photosynthesis, the carbon dioxide from the air is taken into the green leaves, and water is taken in through the roots. These two compounds—carbon dioxide and water—in the green leaves, in the presence of sunlight, are made into complex compounds of carbon, hydrogen, and oxygen, which are stored in the form of carbohydrates, fats, and proteins in the roots, stems, seeds, and tubers of plants.

Some plants are richer in stored carbohydrates, while others contain more fats, and still in others protein is found in greatest abundance. Since animals cannot get energy directly from the light and heat of the sun, they must rely upon feeds rich in carbohydrates and other energy building materials.

When maintenance alone is desired, the energy needed is small and therefore a relatively small amount of fuel or energy feed is necessary. On the other hand, when growth is to be made and fat is to be put on, as is true in the case of hogs, a great amount of energy is required and, therefore, much fuel or energy feed is necessary.

Starch is one of the main carbohydrates in plants. The reserve food in the seeds and tubers of most plants is principally starch. Especially is this true of cereal grains such as corn, rye, wheat, and the tubers. Starch is the primary source of carbohydrates for hogs.

Sugar is another important form of carbohydrate. Some plants, such as sugar cane, sugar beets, fruits, and sweet corn, store some of their carbohydrate in the form of sugar. Sugar is a more digestible form of carbohydrate than cellulose or starch. In animal nutrition, cellulose and starch are converted into a form of sugar before they are absorbed by the animal.

Fats: Fats and carbohydrates are alike in that they both contain carbon, hydrogen and oxygen. However, the proportion of carbon and hydrogen to oxygen is much greater in fats than in carbohydrates. Fats are found in the seeds of plants along with carbohydrates. Some seeds, such as cottonseed, soy beans, and peanuts, have a very high percentage of fats. Fats are classed as *energy foods* and furnish about two and one-fourth times as much energy per pound as do carbohydrates, and, therefore, have a higher food value per pound. However, fats are more difficult to digest than most of the carbohydrates—especially starch and the sugars.

Protein: Protein compounds are made up primarily of carbon, hydrogen, oxygen, and nitrogen. Thus we see that proteins contain all of the elements that carbohydrates do, but in addition they contain nitrogen. Due to this composition, proteins have two functions in animal nutrition. Because of the carbon, hydrogen, and oxygen content, they are *energy foods*. Because of the nitrogen content they supply *building material*. Proteins are important constituents of every living cell in the body and form an important part of the muscle tissues of animals. They are also important in the production of the skin and hair of animals. The protein requirement is much less in a ration for maintenance alone. The protein requirement is much greater for growth and reproduction.

When proteins are used as a building material the nitrogen element is of primary importance. They are used by each cell for its up-keep and for the formation of new living tissue. Proteins that are supplied in excess of the amount necessary to supply the nitrogen are not entirely wasted, however, due to the fact that when more is supplied than is needed for the repair

and formation of the body tissues the remainder may, after the nitrogen is split off, be changed into body fat. It is important to determine in advance how much protein is necessary for each purpose that is mentioned above. The most practical way, as has already been explained, is by feeding animals and noting the effect of various amounts on maintaining life and promoting growth. Chemical studies of the nitrogen balance are sometimes made. It is important that a correct balance between proteins, carbohydrates, and fats be maintained in order to secure the most economical use of these nutrients in profitable hog production.

Mineral Matter: There are several mineral elements needed for the development of certain parts of animals. Some of these elements are calcium, phosphorus, iron, potassium, sulphur, and magnesium. The most important of these in the *body tissues and framework* of animals are calcium and phosphorus. Most feeds contain some of the essential mineral elements.

For hogs it is generally necessary to provide additional minerals from sources other than plants. Especially is this true when hogs do not have access to a great variety of plants. Bone meal and limestone are examples of mineral matter that are rich in calcium and phosphorus. Lack of mineral elements for growing hogs will result in a weak skeleton. The breaking down in the back and pasterns of hogs, and the prevalent crippled condition of fattening hogs, are caused directly by mineral deficiencies.

Vitamins: During the last few years a lot of attention has been given to vitamins for livestock. A deficiency of any of the vitamins—A, B, C, D, E, and G—will cause trouble. Most of these vitamins are found in the more common feeds for hogs.

Vitamin A is of very great importance in animal nutrition. Young animals cannot live without it and it is essential for the maintenance of mature animals. This vitamin is found in abundance in alfalfa hay, green alfalfa, green grasses, green kale, and to some extent in yellow sweet potatoes and in a number of other feeds. Hogs that have access to green grazing are sure to obtain plenty of vitamin A.

From animals can synthesize (manufacture) vitamin C from other substances in their feed. This is not true of human beings.

Hogs in the South are usually out in the sunshine enough to get all the vitamin D they need.



Fig. 3-5. Simple Watering Device. Plenty of fresh, clean water is essential for hogs.

Vitamin E affects the reproductive organs. It is abundant in the cereals and in the oil of other seeds and grains that are used for hog feed. In the form of cold pressed wheat germ oil, it has been found useful to aid in the correction of reproductive sluggishness of the sow and boar. Vitamin G is also found in ample quantities in the more common rations of hogs.

Antibiotics: Since about 1950, much has been heard about antibiotics in feeding livestock. Some have called this the "miracle drug" in livestock feeding. Although more research is needed to substantiate some of these claims, the importance of antibiotics in feeding livestock has been accepted. The alert grower of hogs will want to keep informed on this rapidly changing area of feeding. The following standard terms have been established:

1. *Vitamin B₁₂ Supplement.* Must contain at least 1.5 milligrams of vitamin B₁₂ per pound of supplement. This material is used for supplementing a ration where protein is derived mainly from peanuts, soybeans, or other plants.
2. *Antibiotic Feed Supplement.* Must contain at least one grain of antibiotic per pound of supplement. It may consist of one or a combination of growth-promoting antibiotics. This material should be added when protein in the feed is from meat, fish, milk or other animal products, along with Vitamin B₁₂ Supplement.
3. *Vitamin B₁₂ and Antibiotic Feed Supplement.* This material is a combination of the above two and must

contain at least the minimum concentrations listed in each case. This can be used in feed where protein is from animal products rather than the combination listed in (2) above. Check the cost to determine which to use.

Based on present knowledge, Ensminger (11) summarizes the effects of feeding antibiotics to hogs as follows:

1. Five to 20 per cent more rapid gains from birth to 200 pounds.
2. Better appetite. Feed consumption increased 10 to 20 per cent. Drink more water.
3. Feed efficiency increased in dry lot by about 10 per cent; which means saving about 40 pounds of feed per 100 pounds of gain on fattening pigs.
4. Fewer runts, thus making a more uniform pig crop.
5. Less trouble with scours and non-specific enteritis.
6. Better for dry-lot feeding but helps pigs on pasture too.
7. Maximum growth response is from pigs under 100 pounds.
8. Five to 10 pounds heavier at weaning (8 weeks) when creep-fed.
9. Less response when fed to healthy animals in healthy environment.
10. Do not interfere with gestation and lactation, but not recommended for this period.
11. Perhaps lessen requirements for energy, for protein, and for certain water-soluble vitamins.
12. Most effective antibiotics for hog feeding, (based upon experimental results to date) for rate and efficiency of gains are: *terramycin*, *aurcomycin*, and *Procaine penicillin*. Also effective in some experiments has been *Bacitracin* in combination with penicillin.
13. For best practical results, antibiotics should be fed at the rate of about 5 to 10 grms per ton of total feed. (This is 2 to 4 per cent of the dosage for treatment of chronic diseases such as scours.)

Green Grazing: Although grazing for hogs is not classified the same as proteins and the other groups studied in this sec-



Fig. 3.6. For economy in hog feeding, plenty of green grazing must be furnished. This champion sow and litter, owned by a Future Farmer, is being provided good grazing. (Courtesy, Texas FFA)

tion, it is so important in the general plan of hog feeding that a brief summary is given here. Better hogs can be grown with a saving in feed costs by proper use of pastures. Good pasture can reduce grain cost per 100 pounds of gain by as much as 20 per cent, and the protein supplement by as much as 50 per cent. Hogs on good pasture may yield a higher return per acre than any other acre on the farm. A well-rounded hog feeding program will include both permanent and temporary pastures, planned for year-round supply of green grazing.

Water: Water, which is composed of hydrogen and oxygen, comprises a greater part of animal tissue than any other single

compound. A constant supply of water in the body is one of the essentials to the life of the animal.

The functions of water in animal nutrition are (1) it acts as a regulator of body temperatures; (2) it is important in the chemical reactions that take place when food changes from the original raw material to substances that may be absorbed by the animal; (3) it functions in supporting the tissues of animals; (4) it acts as a solvent and carrier of food materials and waste products; (5) it facilitates osmotic activity, which is essential to food assimilation by animals.

A sanitary supply of water should be kept before hogs at all times.



Fig. 3-7. Good feeding does not mean fat hogs. S. J. Morris, Luverne, Alabama, is watching his Landrace pigs develop into meat-type hogs. (Courtesy, S. J. Morris, Luverne, Ala.)

Feeding Experiments: There have been hundreds of experiments conducted by the agricultural experiment stations of the South on the effect of different feeds in the production of hogs. These experiments have been carefully studied and analyzed. The alert hog-grower will secure the latest information on feeding hogs from his State Experiment Station. Write the Animal Husbandry Department at your State Agricultural College for the latest reports on hog-feeding experiments.

SUMMARY

This chapter has been an introduction to feeding hogs. Since feed is about 80 per cent of the total cost of growing hogs, the grower who makes money on his hogs will study his feeding problems. He needs to understand *why* a balanced ration is needed as well as *what* is needed to balance the ration.

It is clear that feeding is one of the major management problems in growing hogs. Although extremely important, it is closely related to other management problems of marketing, breeding, sanitation and facilities, as well as ability of the hogs to efficiently convert feed to meat. Green grazing is also a key part of the feed problem.

Although relatively new in hog feeding, antibiotics have a definite place. The alert hog grower will keep up-to-date in this new field.

PROBLEMS AND ACTIVITIES

1. Why is feeding such an important job in swine production?
2. Why should adequate feeding programs for hogs be developed on each farm?
3. Are there problems in animal nutrition of hogs on the individual farms of members of the group?
4. What are some of the difficulties in feeding hogs on the farm?
5. At what weight are hogs marketed on the farm?
6. Calculate the total penalty in price per pound of hogs that are not number ones on each farm.
7. Calculate the net returns after deducting feed cost for hogs on the farm.
8. What kinds of feed are now provided for hogs on the farm?

9. Classify the feeds for hogs on the farm as carbohydrates, fats, proteins and minerals.
10. Name some feeds other than those on the farm that are rich in carbohydrates, fats, proteins and minerals.
11. What is the function of carbohydrates in animal nutrition?
12. What is the function of fats in animal nutrition?
13. What is the function of proteins in animal nutrition?
14. What is the function of minerals in animal nutrition?
15. What is the function of water in animal nutrition?
16. Discuss the importance of vitamins.
17. What is meant by antibiotics in feeding hogs?
18. Is providing green grazing for hogs really necessary?
19. Make visits to several farms of the community and compare the growth of hogs in response to different feeding programs. Some of the farms selected for study should reveal profitable hog production due to good feeding programs. Others should reveal unprofitable hog production due to poor feeding programs.
20. Write your state agricultural college for the latest information on feeding hogs. Ask about recommendations on green grazing for hogs.

CHAPTER 4

Providing Buildings and Equipment

Proper buildings and equipment can change the care of hogs from a "messy chore" to an enjoyable routine. Poor equipment often means waste of feed. Time and labor can be saved by proper use of the right equipment. Sanitation is almost impossible without needed equipment. Hogs are often considered to be dirty and it is generally thought that they like filthy places in which to live. Frequently this is the fault of the buildings and equipment being used. The lack of proper equipment sometimes results in bruising the animals, later causing a loss at the market. All these common problems in growing hogs can be solved by efficient use of proper buildings and equipment.

In spite of the importance of buildings and equipment, growing hogs requires relatively little investment in buildings and equipment when compared with other livestock and poultry. In fact, the grower can invest in useless housing and gadgets. Particularly in the South much of the equipment needed elsewhere (such as water warmers) is not needed. In fact, some types of permanent housing may cause considerable difficulty in controlling diseases and parasites. Some experimental work has been done in some of the southern states on no housing other than temporary cover in extremely bad weather and farrowing and shade in the summer sun. A check with the State Experiment Station might save money.

Again, it is emphasized that deciding on buildings and equipment is another management decision for the alert hog grower. Securing and properly using needed equipment is part of the over-all management of hogs and should not be considered as a separate problem. For example, the type of hog program will determine the use of self-feeders or the extent of the need for fences for pastures.

Some small hog growers have been known to invest in equipment and never use it enough to pay for itself.

There are four general problems involved in providing building and equipment for swine. They may be stated as follows: (1)

housing the hogs; (2) building hog fences; (3) providing watering and feeding equipment; and (4) providing equipment for handling and caring for hogs.

I. HOUSING HOGS

In discussing the problems of providing housing for hogs, it is impossible to make specific statements that will cover all conditions in each of the states of the South. This is so because there exist wide ranges in climatic conditions in this region. There are also wide differences in the types of farming and the importance of the hog enterprise on various farms. Therefore, the information in this chapter is to help the individual farmer analyze this problem so that he may decide how to adapt to his own farm the kind and types of houses that best meet his needs.

There are two kinds of houses in general use throughout the South: (1) the central or stationary hog house; and (2) the movable hog house. Within these two general types there are many variations. The central house provides for a number of sows under the same roof, and the individual house is used for only one sow. While both types of houses are used with success, the individual house has recently grown in favor especially in the warmer portions of the South.

Central Farrowing House: The central house has some advantages over the individual house, because it brings all of the sows under one roof and the labor in care and feeding is lessened. Also heat is more easily provided when the weather is extremely cold and damp.

A gable roof house placed lengthwise north and south makes a good central house for almost any section of the South. This form of building is inexpensive and can be varied to meet the weather conditions in any locality. In all cases the house should be well built and of weatherproof construction. In the northern portion of the region, the house may need to be sheeted and insulated with building paper beneath the clapboards.

The United States Department of Agriculture has designed a central house that can be adapted to almost any situation. A drawing of this house is shown in Fig. 4-1.

This plan has a 6 foot alley-way with a sliding door in each end the full width of the alley. There are 12 outside feeding pens in this particular plan. These feeding pens are placed on

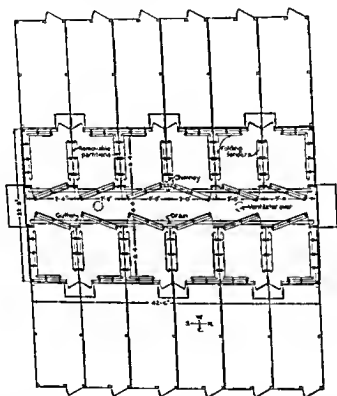
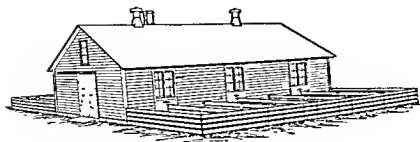


Fig. 4-1. Central Hog House. This drawing shows a type of central hog house which is suitable for southern construction. (Courtesy, USDA)

both the east and west sides of the house. This permits the pens to be built any length desired.

This house is very adaptable: (1) It can be insulated to meet weather conditions; (2) It can be constructed any length to accommodate the number of sows on a given farm; (3) The pens can be of any length; (4) A chimney can be built if the situation demands it; (5) The expense of construction is also very adaptable to the materials at hand.

It should also be noted that ventilation is provided by windows in the gables and ventilators in the roof. Each pen is pro-

vided with a large window for admitting sunlight. This is an essential feature of the plan.

Floors: The floor of the central house may be made of concrete, wood or tile. Many find plain concrete floors are satisfactory, but in some locations these floors become damp. There are several ways to prevent dampness: (1) a coat of tar or a strip of tar paper placed between two layers of concrete when the floor is laid is an effective insulation; (2) a layer of cinders, crushed stone or gravel placed beneath the concrete may be used.

Wooden floors are generally unsatisfactory in hog houses. They do not last long, and they are likely to become infested with rats.

Hollow tile laid flatwise and covered with about $\frac{1}{2}$ inch of concrete, makes very serviceable and satisfactory floors for hog houses.

Guard Rails: The farrowing pens should be provided with guard rails on each side. This is essential to protect the young pigs from being crushed against the side of the pen when the

Fig. 4-2. Farrowing houses being built by vo-ag boys under the supervision of the teacher of vocational agriculture. (Photo by J. K. Coggin)



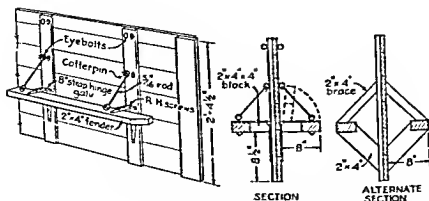


Fig. 4-3. Detail of Guard Rail. Guard rails should be provided to prevent sow from crushing pigs. The one shown here is suitable for the central farrowing house. (Courtesy, USDA)

sow lies down. The details of the guard rail for the house described above are shown in Fig. 4-3.

Besides being used for sows at farrowing time, the central house may be used for fat hogs or bred sows. This fact makes it desirable to have all partitions removable so that larger space may be provided when needed.

The Movable Hog House: The movable hog house has many points in its favor, and it is widely used throughout the southern states. Most of the individual houses are of the A-type, but some farmers prefer the shed type. In either case the principal advantage of these houses is the fact that they can be moved from place to place as the situation demands. At one time they may be brought together for convenience of caring for several brood sows with their litters at the same time; at another time the house or houses may be transported from one field to another to take advantage of grazing crops or permanent pastures.

Since the movable character of these houses is their principal advantage, they should be designed and constructed to be moved about. Therefore, these houses should be well braced and substantially built. Durability built into the movable hog house is an economy worth considering.

In the lower south the A-type house is generally built without a floor, and with only one end closed. This house should be set down with the open end facing the south, and when the weather is adverse at farrowing time, a gunny sack covering may be placed over the opening. When the conditions become extremely cold, a lantern or two may be suspended from the

apex of the house high enough so that they will not touch the sow as she moves about.

In the colder portions of the region closed houses are built, as shown by drawing. In the extreme northern portions floors are also provided. In closed houses the door should be 30 inches wide and 36 inches high. Such a door will admit any hog.

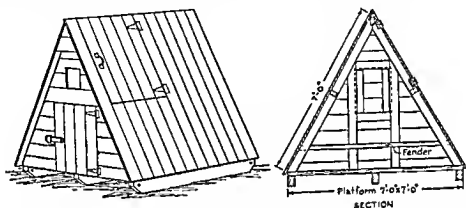


Fig. 4-4. Movable A-type Hog House. This type hog house is widely used throughout the southern states. (Courtesy, USDA)

Bill of Material for A-Type House

No. Pieces	Dimensions
3	4"x 6"x 8' for sills
6	2"x 4"x16' for framing and guard rails
10	1"x 4"x16' for roof and ends
10	1"x 4"x16' for roof battens
4	2"x12"x16' for floor

Hardware:

- 2 pr. 4" strap hinges
- 1 door elasp and eye
- 1 lift handle for roof door

For either the open front or the closed front A-type house, sills or runners should be 4 inches by 6 inches, and should extend six or more inches beyond the end of the house. When a floor is provided, there will be three floor timbers running lengthwise of the house. Variations in construction of the A-type house are found in different sections of the South, but in all cases when used as farrowing pens a guard rail or fender should be provided across the closed end of the house. If the house is of the dimensions indicated in the diagram (7'x7'x7') the sloping roof protects the pigs from the sow on two sides.

Fig. 4-5. A low, shed-type house built to conserve materials. This southern farmer is telling the vo-ag teacher that this type housing makes sanitation easy. (Photo by J. K. Coggin)

Shed-Type House The shed-type house is well adapted to southern conditions. In warmer portions of the region they are boarded tight on three sides and provided with guard rails. They can be built with or without a floor. In the colder portions these houses may be closed in on all sides with a door at least 30 inches wide by 36 inches high to admit the sow.

Bill of Material for Shed-Type House (8 ft. wide, 7 ft. deep)

No. Pieces	Dimensions
2	4"x4"x10' for runners
2	2"x4"x 4'6" for frame
2	2"x4"x 3'6" for frame
2	2"x4"x 8' for frame
2	2"x4"x 7' for guard rail
1	2"x4"x 6'8" for guard rail
6	1"x8"x 8' for back wall
26	1"x8"x 7' for floor and ends
13	1"x8"x 8' for roof

Hardware:

- 4 sheets galvanized roofing 2'x8' for roof
- 5 pounds lead-head roofing nails for roof
- 5 pounds 10-penny nails
- 5 pounds 8-penny nails
- 3 pounds 20-penny nails

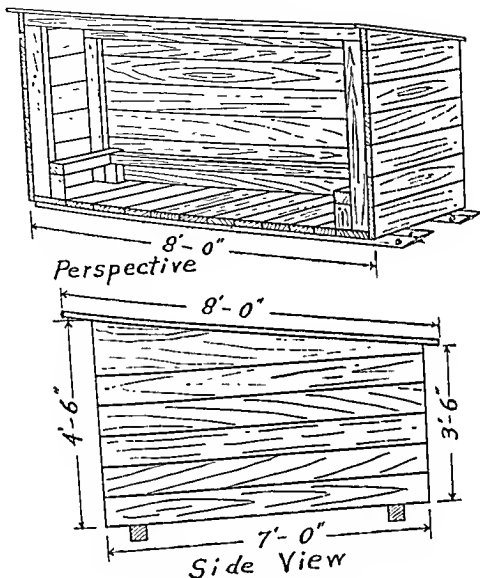


Fig. 4-6. Shed-type Hog House. Another type of movable hog house that is popular in the South. (Courtesy, USDA)

Box-Type House: The United States Department of Agriculture suggests a box-type design that has given good results on the experimental farm in Beltsville, Maryland. The size is 7 feet by 8 feet on the ground. One-half of the roof at the front of the house is hinged and may be thrown back over the rear half, allowing sunlight and excellent ventilation for the entire interior of the house. This door allows herdsmen easy access to give any needed assistance to the sow or litter. Guard rails are essential on all enclosed walls of this house. In the lower South they may be built with one end open instead of using a door.

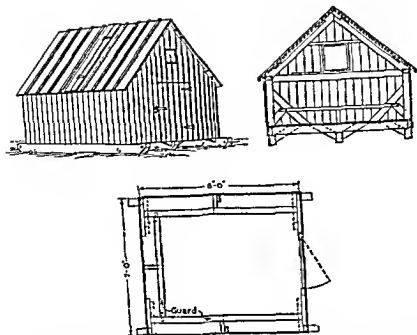


Fig. 4-7. Box-type Hog House. This type movable house has given good results on the USDA experimental farm at Beltsville, Maryland. (Courtesy, USDA)

Bill of Material for Box-Type House

- 3 piece 4"x 4"x 8' for skids
- 2 piece 2"x 4"x12' for studding
- 3 piece 2"x 4"x 8' for ride pole and plates
- 3 piece 2"x 4"x16' for rafters
- 5 piece 2"x10"x12' for floor
- 1 piece 1"x 4"x12' door braces
- 200-board ft. 16 ft. shiplap

Hardware:

- 2 pair 8" strap hinges
- 1 door clasp and eye
- 5 pounds 8-penny nails
- 5 pounds 10-penny nails
- 2 pounds 20-penny nails

II. FENCING FOR HOGS

A good permanent hog fence made of good material is at best rather expensive. It is desirable, therefore, that it be well built. A recent publication on farm fences has been prepared by the Southern Association of Agricultural Engineers and Voca-

tional Agriculture, Athens, Georgia. Although this publication deals with all farm fence problems, it has many details not available before in one publication.

The United States Department of Agriculture gives the suggestions here outlined.

The Wire: Woven wire makes the most practical hog-tight fence. For enclosing large fields (10 to 20 acres or more) the 26-inch fence is probably the best to use. The stay wires should be 6 inches apart, of not less than No. 11 size. The top and bottom horizontal wires No. 9, and the other wires not smaller than No. 12. For inclosing pastures or lots of from 1 to 10 acres the fence should be 32 inches, and for smaller lots not less than 36 inches high. The fence around a boar lot should be 48 inches high and made of No. 9 wire. Woven wire of any kind is not desirable for inclosing a lot 100 feet square or smaller. Good, substantial lumber should be used for that purpose.

Fence Posts: The desirability of any fence depends upon the corner posts more than anything else. The corner and second posts should be set about 8 feet apart. Both should be set deep; in most soils 4 feet is necessary, and the earth should be well tamped. A horizontal brace, using a 4 x 6 inch timber of proper length or a 4 or 5 inch round post, should be notched into the corner and second posts about 8 inches below the top. From the second post at the brace a strand of No. 8 galvanized wire is

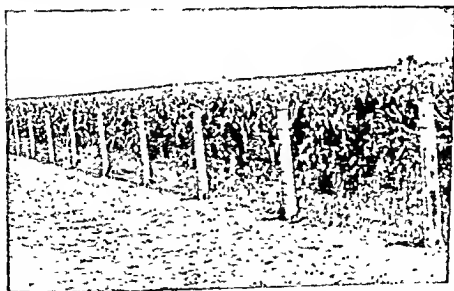


Fig. 4-8. Concrete Fence Posts. This type post gives a substantial, attractive fence. (Courtesy, Portland Cement Association)

carried on each side of the corner post at the level of the ground and beyond in a straight line through a trench to a "dead man" or anchor about 2 feet long placed crosswise to the trench. Twisting the two wires between the anchor and the post and between the two posts will tighten the anchor against the trench banks and securely hold the brace and the braced posts to each other. This causes the two posts, the brace, and the brace wires to form a unit which will give the maximum stability to the corner post for resisting the tension of the fence wire.

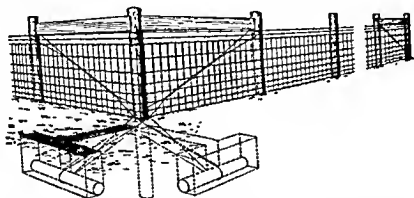


Fig. 4-9. Corner Post. This drawing shows how to brace and anchor a corner post.

If the corner post is of sufficient size and well anchored, the intermediate posts are not of so great importance, but they should be of good, lasting material and well set. The most durable wooden posts are cypress, red cedar, black locust, white oak, catalpa, mulberry, and chestnut. The durability of wooden posts may be greatly increased in treating them with creosote before they are set.

Concrete posts are being used on many farms. They can be constructed on the farm at reasonable cost, and they last indefinitely. Directions as to how they may be made may be obtained from the Portland Cement Association.

The intermediate posts should be set from 18 to 24 inches deep and be well tamped. They should not be more than 16 feet apart with a half-length post between. For fields of from 1 to 10 acres they should be about 12 feet apart, and for a small lot 8 feet.

Fence posts made from trees on the farm should be treated by chemicals for longer life. This treatment can be done for

small cost. Some vo-ag departments have post-treating facilities. In some sections commercial post-treating plants are available. Some farmers do their own treating of posts. The Agricultural Engineering Department of the State Agricultural Colleges can furnish details for doing the job on the farm.

Stretching the Wire: The wire must be stretched taut, for hogs soon attempt to get through a slack fence. However, it is impossible to stretch and keep taut any fence if the corner posts are not securely set.

It is desirable to stretch a strand of barbed wire beneath the woven wire and staple it to the posts about 1 inch from the ground to prevent hogs from breaking out. The larger fields may be used also for other kinds of livestock. In that case, when the 26-inch fence is used, a wire should be stretched and stapled about 6 inches above the top of the woven wire and then as many strands of wire above that as may be needed.

After fastening one end of the wire securely to a braced end or corner post, the wire should be unrolled along the fence line with the lowest bar next to the line of posts. The stretching device is then securely attached near the free end of the roll of wire at a point about halfway between the corner or end post and the second post.

In stretching it is necessary to lift the fence frequently from the ground at different points to prevent dragging over projections and bending or kinking the wire.

The wire should be stretched evenly, the top and bottom bars having about the same tension. When the fence is stretched taut it can be securely stapled to the end post or one next to it.

The bars should be stapled to the line of posts with staples of sufficient length for securely fastening them to the post, but the staples should not be driven in so far as to interfere with the contraction and expansion of the fence due to changes of temperature.

Gates: A farm gate that is not well made and well hung is a source of constant trouble. The whole construction of the fence may be of the best material, but if the gate design is faulty hogs will get out and much trouble will result. In making farm gates an added expense for providing well-seasoned material, bolts, and good, heavy hinges for hanging them is certainly justified.

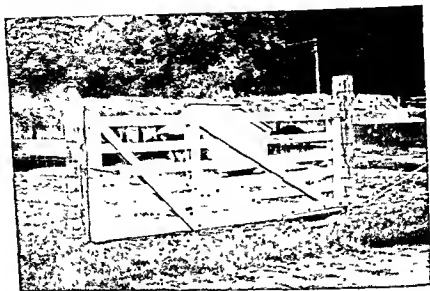


Fig. 4.10. A well-made, attractive farm gate. Unless the gate is well designed and constructed hogs will get out and much trouble will result. (Courtesy, USDA)

Temporary Fencing: It is often good business to use temporary fencing in growing hogs. For many years small farmers in the South have used the same fences for different fields by simply moving the fences to the field of peanuts to be hogged-off, or other temporary grazing areas. Although this practice increased the labor it greatly reduced the total cost of fencing required for the hogs. At the same time it gave the farmer an opportunity to practice rotation in the fields to be used for grazing.

In recent years many farmers have used *electric fences*. These are available for attachment to the regular power line or with batteries that furnish electric power. If properly installed they are not dangerous. They prove effective in keeping hogs in the field. Except for small pigs, hogs can be easily trained to stay within the electric fence. Before placing the hogs in a field where an electric fence will be used, it may be well to "train" the hogs by placing the electric wire inside a permanent fence until the hogs get "shocked," then they usually avoid the fence. However, where the grazing is sufficient, there is no trouble in using the electric fence. Before buying and installing an electric fence, the hog grower should check with a neighbor who is using one in his hog business and discuss its use. If none are available, he should write the Agricultural Engineering Department of the Agricul-

To fill the barrel, plug the outlet hole and remove filler plug. Keep the outlet hole plugged until the barrel is completely filled and the filler plug or cap is tightly replaced. The plug may then be removed from the outlet opening and water will flow out until the outlet is covered.

Many farmers are now using steel oil barrels for this purpose.

Feeding Equipment: Feeding equipment for hogs should include troughs and self feeders. Hog troughs are used on almost every farm in the South. Some of these troughs are of the com-

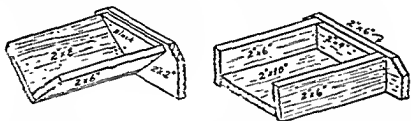


Fig. 4-12. Troughs. Here is shown one end of a V-shaped trough (left) and one end of a flat bottom trough (right). (Courtesy, USDA)

mercial metal type, but most of them are V-shaped or flat bottomed, homemade wood troughs. The flat bottom troughs can be made to accommodate any number of hogs, and should be about 24 inches wide for mature hogs. The accompanying diagram gives a good working basis for constructing such troughs.

Hog troughs may be made with concrete. Figure 4-15 shows the wood form and the finished concrete trough. This trough is very desirable since it is too heavy to be turned over by the hogs and will last a lifetime. In order to facilitate cleaning, a piece of one-inch pipe cut the thickness of the trough may be placed through a hole cut in the bottom of the trough near one end. The pipe should be put in position as the concrete is placed in the form.



Fig. 4-13. Water Trough. This trough is arranged so that the hog cannot wallow in it but has room enough to drink. The cover can be removed when it is necessary to clean the trough. (Courtesy, USDA)



Fig. 4-14. Finishing a self-feeder in the vo-ag shop for his feeder pigs as part of adult class program. He saved money and made the feeder just as he wanted it. (Photo by J. K. Coggin)

Self-Feeders for Hogs: Self-feeders have been found satisfactory and economical for feeding young pigs and for fattening hogs for early market. Self-feeders are essential in the sanitary set-up.

Recent tests show that in using self-feeders for feeding whole grain the hogs took more time to chew their feed and ate a little at different times throughout the day instead of greedily gulping it down whole in a short time as they do when the ration is fed by hand twice per day. One linear foot of trough space should be allowed for every three pigs. One foot is needed for every two hogs.

Many self-feeders are a failure because they either clog and fail to furnish enough feed or else they run too freely and waste feed. If the feeder is to be used outside, much care should be taken to protect the contents against waste due to wind and rain.

The self-feeder shown by Figure 4-16 has been found satisfactory for outdoor feeding by Experiment Stations. It is adapt-

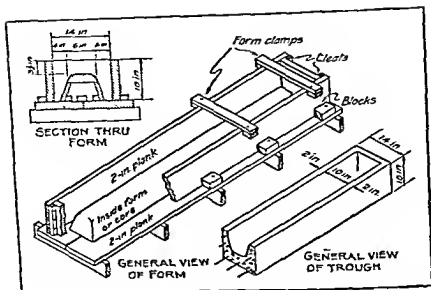


Fig. 4-15. Concrete Hog Trough. This drawing shows a wood form and a finished concrete trough. (Courtesy, Portland Cement Association)

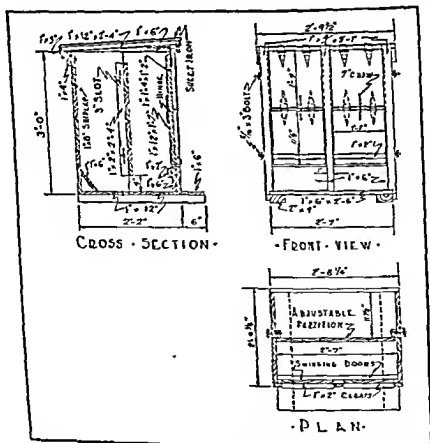


Fig. 4-16. Self-Feeder. Here is shown a drawing of a self-feeder that may be used for brood sows, suckling pigs and fattening hogs. (Courtesy, USDA)

able to the feeding of sows, growing pigs, and fattening hogs. A feature of this feeder is the suspended door arrangement that provides ample space for the hogs, protects the feed, and at the same time holds the weight of the suspended doors off from the shoulders of the feeding animals.

Bill of Material for Small Self-Feeder

No. Pieces

1	2"x 4"x 6' skids
2	1"x 8"x12' shiplap for sides and partition
1	1"x12"x12' floor and lid
1	1"x 6"x12' for baffle, steps, etc.
1	1"x 2"x10' for partition and doors
1	1"x 3"x10' for lid
1	1"x 4"x12' for door stops
1	1"x14"x 6' for doors

Hardware:

- 8 pr. 4" strap hinges
- 1 pc. sheet iron 28"x3'-6"
- 36 $\frac{1}{4}$ "x2" bolts and nuts for hinges
- 4 $\frac{1}{4}$ " threaded wing nuts
- 1 foot tie chain
- 4 $\frac{1}{4}$ " wood screws
- 4 $\frac{1}{4}$ "x3" bolts
- Nails, 6-penny and 8-penny

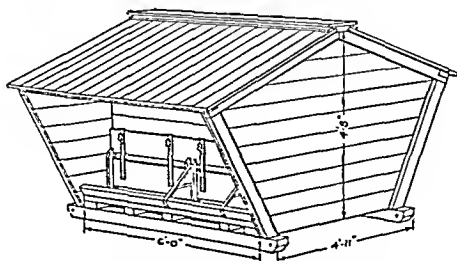


Fig. 4-17. Another Type of Self-Feeder. This type of self-feeder has proved to be satisfactory and economical. (Courtesy, USDA)



Fig. 4-21. Pig brooder made by using infrared lamp as source of heat which can be raised or lowered. (Courtesy, Florida Agricultural Extension)

the pig tries to find a warm spot. The guard rails, already mentioned, will prevent some of the pigs being mashed and the electric pig brooder will reduce losses due to chilling.

Even in the South preventing chilling may pay by saving some pigs. Florida Agricultural College reports that the electric pig brooder saves an average of one pig per litter. An electric pig brooder can be bought or it can be built at small cost. It should fit the farrowing house, or the area where the pigs are born. See Figures 4-19, 4-20 and 4-21 for types of pig brooders.

Temporary Shade: In the South, temporary shade is an essential feature in protecting pigs from certain internal parasites. Shade from trees, fences, or buildings is also a sheltering place for most hog parasites.

The temporary shade can be made by constructing a framework of strong poles over the tops of well-set posts. These posts should be about four feet high and placed in rectangular patterns. Across these poles, smaller poles can be placed, and then the entire pole framework covered with the pine boughs, straw or other covering.

Breeding and Shipping Crates: In transporting breeding stock, even for short distances, shipping crates are necessary, and can be provided at small cost. From the design shown by Figure 4-22, a bill of material can be worked out, and by following the detailed plan an inexpensive shipping crate can be constructed.

Another type of self-feeder shown in Figure 4-17 has been proved to be satisfactory and economical by the United States Department of Agriculture. This feeder is provided with a movable board, held in place by a thumb screw, which enables the operator to regulate the flow of feed. Regulation is required when the kind of feed is changed. However, any self-feeder should be examined frequently to see that it is in good working order.



Fig. 4-18. Young farmer checking on self-feeder built in vo-ag shop.
(Photo by J. K. Coggin)

The Creep: When young pigs are about three weeks old they are fed something to supplement the sow's milk. Beginning at this time the pigs should have access to a creep from which the sow is excluded, and in which the self-feeders with the supplementary feed is enclosed.

The creep should be large enough to accommodate the pigs without crowding. There should be one or more openings into the creep large enough to admit the pigs, and small enough to exclude the sow.

IV. OTHER EQUIPMENT NEEDED FOR HOGS

Electric Pig Brooder: On many farms there is a difference in the number of pigs farrowed and the number weaned. This may be the margin of profit for the litter. Two major causes of loss of young pigs are mashing and chilling. It may be that chilling is also the cause of some of the mashing by the sow as



Fig. 4-19. Hover-type homemade electric pig brooder made with wood and sheet metal. Suitable for any type farrowing house. (Courtesy, Florida Agricultural Extension Service)

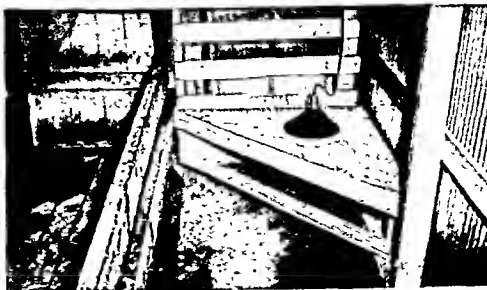


Fig. 4-20. Homemade pig brooder using an ordinary 100 watt electric light bulb. (Courtesy, Florida Agricultural Extension)

The breeding crate shown by Figure 4-23 can be easily planned and constructed on the farm. The angle irons can be made by any blacksmith, or by anyone semi-skilled in forge work who has access to a forge and anvil.

SUMMARY

Hog growers in the South do not need some of the buildings and equipment used in the North Central States. However, proper buildings and equipment are important in the hog business anywhere. Use of needed facilities may mean the saving of pigs and feed. Diseases and parasites can be more readily controlled with proper buildings and equipment.

Much of the needed equipment can be built. Cost of building feeders and other equipment should be compared with the equipment already available on the market.

Particular attention should be given to equipment at the time of farrowing and until pigs are weaned. Guard rails are always needed at farrowing. Electric Pig Brooders have proved their value when the weather is cold. The feeding creep is a valuable bit of equipment.

The use of Electric Fences makes the job of providing temporary grazing or hogging-off peanuts an easy matter.

The alert hog grower considers his building and equipment needs as a management problem to be decided upon along with feeding and other problems of growing hogs efficiently.

PROBLEMS AND ACTIVITIES

1. Make a list of the different types of hog houses being used in your community. What are the advantages of each type of house?
2. Why is a hog pen sometimes "smelly and filthy"?
3. Compare the cost of building a self-feeder for your farm and buying one at the feed store. What are the advantages of each?
4. Have you ever seen an Electric Pig Brooder? Check the farm magazines for a picture of a brooder in use.
5. Ask your vo-ag teacher about a copy of the Farm Fencing Bulletin published by Southern Agricultural Engineer-

ing-Vocational Agriculture Association. If no copy is available write the Association at Athens, Georgia.

6. Write your Agricultural Engineering Department of your State Agricultural College for information on building an Electric Pig Brooder, and for information on Electric Fences.
7. Also write your State Agricultural College for plans for making any other equipment you need for growing hogs.

CHAPTER 5

Preventing Diseases and Parasites

"An ounce of prevention is worth a pound of cure." This old saying has a lot of meaning for the problem of keeping hogs healthy. It is much easier, and cheaper, to keep hogs healthy than to try to get them well after they are sick. Even if a sick hog is "cured" it often means that the animal will make less gain, and may sell for less at the market. In addition to stunted growth, tremendous losses occur each year as a result of diseases and parasites.

The strange thing about the losses due to parasites and diseases is the attitude of many southern hog growers. They apparently figure that the losses will always happen to the other fellow. Proof of this statement is found in the fact that many hog growers in the South make no plans for the prevention of parasites and diseases in the hogs on their farms. The more common practice seems to be to wait until cholera or some other disease hits the hogs in a nearby community before doing anything about prevention. Likewise, in the case of parasites, little attention is given to this problem until the pigs are noticeably stunted or unthrifty in appearance. Obviously, in such cases, it is already too late to do the best possible job of growing hogs.

This chapter is devoted to *sanitation* and *vaccination*; that is, to the need for a *program of prevention of parasites and diseases* in hogs. Such a program of prevention seems to be the key to keeping hogs healthy. Chapters six, seven, and eight deal specifically with the details of controlling parasites—both internal and external—and diseases of hogs.

I. HEALTH OF HOGS

The health of hogs depends upon about the same general practices and rules necessary to keep any animal—including a man—healthy and feeling good. Dr. C. M. Patterson, Veterinary Editor of *The Progressive Farmer*, lists six rules for keeping livestock healthy.

1. Clean *drinking water* for animals at all times.
2. *Feed uncontaminated* with body discharges.
3. Sick animals should be *quarantined*.
4. Good *drainage* is necessary for sanitation.
5. *Rotate grazing* areas.
6. *Control insects*.

If a hog farmer would follow these six basic rules for keeping livestock healthy, much of the difficulty with parasites and diseases would be eliminated. Many hog growers in the South do not follow these simple rules. They, therefore, run the risk of increasing loss and damage to their hogs. There is a common belief among many southern hog growers that hogs like a dirty, filthy wallow. They do like a wallow but it does not have to be filthy. Let us consider the question.

Do Hogs Prefer a Dirty Wallow? Hogs are no more "filthy" than any other animal. The hog's cooling system is not very efficient. He cannot sweat. When he gets uncomfortable—which is at any temperature above 55°—he gets in water, if available, to keep cool. The reason the hog has difficulty in keeping cool is that the layer of fat near the surface of the skin prevents blood vessels being near the outer skin. The hog, therefore, depends upon the evaporation of the water on his body from a wallow to help keep him cool and comfortable.

Hogs do need water in which to wallow when it is warm. This does not mean that the hog likes the filthy place where he sometimes must wallow in order to keep cool. Tests at the Arkansas Experiment Station showed that hogs definitely do better in clean quarters and clean wallows. The group of pigs with sanitary wallows and sheds gained faster and took less feed than did the group of pigs using mud wallows.

Hogs Need to Be Comfortable: Until recent years little attention was given to the comfort of hogs. This was especially true in the South. In fact, hogs were usually the last animals on the farm to be provided with comfortable living quarters. On many southern farms this is still the case—thus hogs are forced to make their beds wherever they can.

Tests in different areas of the South show clearly that hogs not only do better if they are comfortable but that extra gains will pay for providing comfortable conditions. This has been proved by Experimental Stations and on farms. Providing clean

and comfortable quarters for hogs has definitely proved profitable.

Facilities Needed for the Comfort of Hogs: The facilities to add comfort to hogs may vary greatly. A hog grower in Georgia has installed air conditioning for his hogs. He reports that it is paying big dividends. On the other hand, building a trough that will not leak may be the key to a more healthy situation for hogs. Then the proper drainage of the hog lots and pastures, which may take little effort, will add to the comfort and health of the hogs. The addition of a sanitary wallow where none is available will mean healthier hogs that will gain faster on less feed. A report from the Texas A & M College says that a seventy-pound pig with a wallow will gain as much in 76 days as it would in 90 days without a wallow.

At the Louisiana Experiment Station, it was found that a water-cooling system and a clean wallow caused pigs to gain more rapidly on less feed. Table 7 gives the details.

Table 7. Average Daily Gain and Feed Consumed by Fifty Sixty-Pound Pigs Under Different Cooling Systems.

<i>Lots</i>	1	2	3
Average daily gain in pounds	1.49	1.37	1.27
Pounds of feed per 100 pounds of gain	368	373	425

Fig. 5-1.

In Lot 1, there was a water-cooling system that sprayed a fine mist of water over a concrete floor with a straw-covered shed. In Lot 2, there was a sanitary metal wallow. Lot 3 was a dry lot with open shed and no wallow.

Results show that it will pay any hog grower to give attention to the comfort of his hogs from the standpoint of healthy hogs and profits realized.

When Is a Hog Healthy? A successful hog grower will detect any unhealthy condition in his hogs before they actually get seriously sick—except in case of a sudden outbreak of certain diseases. Usually the experienced, close observer can tell if there is trouble ahead for the health of his hogs.

There are two main ways of detecting an unhealthy condition in a hog before the hog actually gets very sick. These two

may be indicated by only two words: *Feed* and *Feces*. This means that if there is a sudden change in the way the hog eats its feed, or the condition of the feces, there is trouble ahead. In other words, the change in the eating habits of the hog or the condition of the feces are "trouble indicators." An efficient hog grower watches for symptoms of trouble and takes steps to combat the trouble.

II. SANITATION

It is much better and easier to prevent parasites and diseases than to treat sick animals. The *key to prevention seems to be sanitation*. Even vaccination, which is discussed in this chapter, cannot replace the need for sanitation.

Sanitation is a double-barreled problem. First, there is the problem of providing facilities and surroundings which *can* be made sanitary. Then there is the problem of actually *keeping* the hogs and their surroundings in a sanitary condition. Sanitation is dependent on the solution of both these problems.

Plan of Sanitation Needed. Most hog growers in the South occasionally decide to clean up the hog lot. This may be a slack work season or just after a rainy season. Just cleaning up the place occasionally is not enough. It is necessary to make and carry out a *sanitation plan* to fit the individual farm situation. A given plan will not work on every farm. There are, however, some guides to follow in any situation. Some of these guides are listed *herewith*.

1. Prepare a clean area for the hogs *after* they are made clean. This may be a pasture, or smaller area or another lot. If possible, this area should be where hogs have not been kept in the past year.
2. If present lot or pens must be used, clean them thoroughly. The first step is to clear out all corn cobs or other material accumulated in the lots. Scatter this material in the fields away from the hog area.
3. Make sure that water will drain away from the pen or lot.
4. If pens are floored, scrub them with *hot lye water* and then rinse thoroughly. There is no need to buy an expensive, strong-smelling disinfectant. Floors should slope about *one-fourth inch per foot*.

5. In a similar manner, clean all feeders, waterers and troughs.
6. Keep hogs off the cleaned area for a few days.
7. Scrub each hog before placing it in the cleaned area. Warm soapy water should be used. A stiff brush does a good job. If hogs are difficult to handle, an old stiff broom on a handle can be used. If this is not satisfactory, let the hogs wallow in soapy water and wash them with a water hose.
8. Give special attention to the place where sows will farrow and young pigs will be kept. Details on this are given in Chapter 16.
9. Adopt the motto, "KEEP THEM CLEAN."

Most problems with hogs due to parasites and diseases can be prevented. A plan of sanitation to fit a particular farm is essential. Prevention is better than cure. The problems of sanitation are largely under the control of the hog grower, to a much greater extent than some other factors, such as marketing. Therefore, the efficient producer of hogs will develop and follow a plan of sanitation for his farm.

Though temporary pastures for green grazing are discussed in Chapter 9, it should be mentioned here because of its value on most southern farms in a sanitation program. Rotating the pasture area is one of the basic sanitation measures which help to keep livestock healthy.

III. VACCINATION

The best insurance against loss from diseases is a *vaccination program*. It should be emphasized that a *program* of vaccination is needed. Too many farmers in the South vaccinate only when there is a "scare" as a result of an outbreak of cholera or some other contagious disease in a nearby neighborhood. This is often too late to serve the purpose and may even do more harm than good. Such delayed action is always more expensive than following a regular program of vaccination along with the sanitation plan. A combination of sanitation and vaccination provides the best chance of growing healthy and profitable hogs.

Blood testing, important in Brucellosis checking, should also be a part of the "insurance program" for healthy hogs. There are details on this phase of the program in Chapter 6.



Fig. 5-2. The agriculture teacher is suggesting that this farmer get the sow and pigs on pasture. The old hog lot makes it difficult to practice sanitation necessary for preventing disease and loss of pigs. (Photo by J. K. Coggin)

Check state and local laws and regulations about vaccinating hogs for cholera. Not only do these laws differ in the states, but the counties within a state may also have different regulations. A veterinarian, vo-ag teacher or county agent will know the regulations governing the vaccination of hogs for cholera, or other special regulations.

Fig. 5-3.

Another important reason for checking on regulations for vaccinating, is that there are considerable differences of opinion as to the dangers involved in different plans of vaccination. It is safest to follow the recommendations of a particular locality. Details as to the procedures to follow are given in Chapter 6, in which cholera is discussed.

It is strongly recommended that the program of vaccination be worked out with the help of a local veterinarian, a vo-ag teacher or a county agent. When the plan is developed it must be followed. Doing only certain phases of the vaccination program may be worse than doing nothing.

From a State Veterinarian: One state veterinarian, Dr. H. J. Rollins of North Carolina, issued a statement in July 1956 urging farmers not to wait until their hogs are infected with cholera before taking preventive measures. He emphasized the importance of vaccination, isolation, and sanitation. Dr. Rollins stated:

"The best results from hog cholera vaccination are obtained before the disease appears. Vaccination will protect healthy or recently exposed animals, but it will be of no benefit to animals in which the disease is already well developed."



Fig. 5-4. Scenes like this are becoming more common in the South. Managing hogs like this gives little chance for parasites and disease to do any damage. (Photo courtesy Mrs. Margaret Mitchell, Oxford, N. C.)

Dr. Rollins also suggested that hogs should be regularly moved to clean premises at least every 12 to 18 months. Also that they should be kept away from land subject to flooding by streams in the community. He also recommended isolating herd replacements for thirty days before putting them with other hogs on the farm.

IV. PREVENTING NUTRITIONAL DISEASES

Clemson Agricultural College suggests the following practices to help prevent nutritional diseases in hogs:

1. Green grazing or ground green, leafy hay should be provided for all hogs at all times, to supply vitamins and minerals.
2. A mineral mixture should be kept before hogs at all times, in a covered box. A mixture of two parts of steamed bone meal, two parts of oyster shell flour and one part of salt is recommended.
3. Loose salt should be provided in addition to the mineral mixture. In sandy soil areas the following mixture should be used instead of plain salt: 100 pounds of salt, 25 pounds of red oxide or iron and one pound of powdered copper sulfate.
4. All hogs should be provided with a protein supplement. Pigs up to fifty pounds need two parts animal protein and one part plant protein. All other hogs should be provided with a supplement composed of equal parts of animal protein and plant protein. Green grazing crops may be used to replace part of the protein supplement.
5. Maximum use should be made of rotated green grazing crops.

SUMMARY

Estimates of losses from hog diseases and parasites every year run into millions of dollars. In addition to these tremendous losses, indirect losses are caused through unthrifty and stunted animals as a result of disease and parasites. Such conditions rob the hog grower of profit and pleasure in the hog business.

Strange as it may seem, most diseases and trouble with parasites in hogs can be prevented. Furthermore, prevention

can be realized through ordinary measures that can be done by any alert hog grower. The key to prevention of diseases and parasites is *sanitation*. A specific plan of sanitation is needed to fit the particular situation, yet there are common guides for any *situation*. *These guides amount to making the hogs comfortable in summer and winter, while at the same time keeping the surroundings clean.*

To complete the preventive measures, a program of vaccination and blood testing should be followed. This program should be discussed and planned with a veterinarian, vo-ag teacher or county agent. State and local regulations make it impossible for the hog grower to follow a general vaccination plan. In case local authorities are not available, a letter to the State Veterinarian should get the desired information for any locality in the state.

The best indicators as to trouble in the health of hogs are: *Feed and Feces*. Any sudden change in the appetite or condition of feces is a signal that trouble may be ahead. The alert hog grower watches his animals and takes the necessary measures for diagnosis and control of the difficulty.

Again it is emphasized that prevention of diseases and parasites is part of the over-all management program. For example,



Fig. 5-5. Keeping up-to-date on hog problems and records is important in any efficient farming program. There is a copy of the USDA Yearbook, "Keeping Livestock Healthy" on this vo-ag student's desk. (Photo by J. K. Coggin)

green grazing is a part of the feed program, yet it plays a major role in sanitation.

PROBLEMS AND ACTIVITIES

1. If most diseases and parasites in hogs can be prevented, why do farmers continue to lose animals from these causes?
2. What diseases have killed hogs in your community during the past three years?
3. How many farmers in your community are concerned about the comfort of their hogs? Why worry about a hog's comfort?
4. Learn exactly what the local and state regulations are governing the vaccination of hogs for cholera. What can you do about the vaccinating? Who can do the vaccinating?
5. What are the regulations about disposing of animals affected by Brucellosis?
6. Check the farm magazines for ads about vaccinating hogs. Do they all agree on the method, procedure and product to be used? If not, how can you tell which is "right"?
7. Outline in detail what it would take to make conditions sanitary on your home farm for growing hogs.
8. Make a Sanitation Plan for your home farm, together with a monthly calendar listing the things to be done each month.
9. Write the Animal Husbandry Department of your State Agricultural College for latest information on sprays and other materials for keeping hog houses clean and free of parasites.

CHAPTER 6

Controlling Diseases

Diseases are a very important factor in economical hog production in the South just as they are in every other section of the country. All farmers who grow hogs will have the problem of disease control. If proper sanitation is practiced and proper preventive measures are taken, the hog farmer should grow hogs with a minimum of trouble. On the other hand, if he is lax in these practices he will likely have much trouble. The hog disease problem is complex, and in some cases difficult, but enough is known about the prevention, sanitation, and treatment of the major diseases so that hogs can be grown without fear of large losses from disease if proper precautions are taken.

The efficient producer of hogs will become "disease conscious" as he cares for his hogs. As indicated in Chapter 5, a great deal of disease control depends upon a sound program of sanitation, vaccination, and feeding, particularly green grazing.

However, even the most careful hog grower may find diseases among his hogs. An understanding of the common diseases found in hogs in the South is essential in detecting symptoms and deciding what steps to take in controlling diseases.

Types of Diseases: The ailments of hogs may be divided roughly into two classes; namely, acute diseases and chronic diseases. The acute diseases appear suddenly. They usually have a short intense course following which the pigs either recover, die, or pass into the chronic form. Some acute diseases are: hog cholera, swine erysipelas, swine influenza, certain types of enteritis (bowel irritation), and others.

Importance of a Prompt Diagnosis: The prompt and proper diagnosis of acute diseases of hogs is very important. This is oftentimes very difficult, even for experienced veterinarians. The diagnosis must be made quickly in order that the hogs may be given the proper treatment before too many have died or become hopelessly ill.

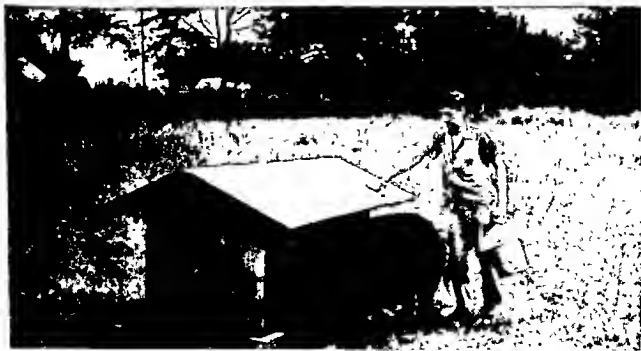
Whenever hogs become acutely ill the first question to ask is "Is this *hog cholera*?" Cholera is still the most prevalent

disease of hogs, and therefore must be eliminated first. It is therefore essential to have a proper diagnosis. Revaccination of hogs that have been properly vaccinated is seldom necessary. However, the use of serum alone has a certain amount of value in hogs sick with any disease as it serves as a blood transfusion.

Symptoms of Acute Diseases: Hogs acutely ill with various diseases all show symptoms or signs of illness that are very much alike. The hogs go off feed, become dull and depressed, show no interest in their surroundings, have a high temperature, huddle together in the bed, often have pneumonia, breathe fast, and sometimes have gummy eyes. The animals may be constipated or have diarrhea, they often vomit, sometimes have fits, and frequently show a red or purple discoloration of the belly. Any acute disease may show all or most of these symptoms at one time or another, so it is obvious that prompt, proper diagnosis is a difficult problem. For this reason it is best to employ a competent veterinarian experienced in swine diseases to attend a herd of sick hogs.

Preventing and Controlling Diseases. The preventing of diseases is a very important part of economical hog production and should be practiced on the farm every day. Numerous remedies and nostrums are sold to farmers for the treatment of sick hogs. A high percentage of these are worthless and the farmer is usually throwing away his money when he buys them.

Fig. 6-1. This vo-ag boy has placed his sow on new pasture he had seeded. She is eating from a self-feeder made in the school shop. (Photo by J. K. Coggin)



Some of the more common swine diseases and the control measures that should be practiced are discussed in the remainder of this chapter.

HOG CHOLERA

This is an acute disease and hogs with cholera show the symptoms described above. Few hogs that become sick with cholera ever recover from it—so prevention is very important. Several methods of vaccinating hogs against cholera are available. They are: (1) use of the hog cholera vaccines; (2) use of serum and virus simultaneously; (3) use of serum alone; and (4) more recently, a "new" safe vaccine.

One might get by without vaccinating for several years but when cholera does strike it will probably cost much more than the vaccination bill would have been all the years vaccination was not done. Vaccination is an excellent, economical type of insurance. Evidence in some counties in the South where special study has been given this problem, indicates that cholera *can be*

Fig. 6-2. Hogs fed out in a new field away from the old hog lot have a good chance of making a profit. The agriculture teacher thinks this Young Farmer is doing a good job of preventing diseases and parasites. (Photo by J. K. Coggin)



wiped out. However, complete eradication depends upon an organized, regulated program with all hog growers co-operating.

Serum and Virus or Simultaneous Method of Vaccination: In this method a dose of anti-hog cholera serum is given to the pig along with a dose of live virus. Hog cholera serum is obtained from the blood of hogs that are highly immune to hog cholera. Hog cholera virus is the cause of hog cholera and is obtained from the blood of hogs acutely ill with cholera. If virus were given to unvaccinated pigs without a dose of anti-hog cholera serum the pigs would develop hog cholera.

The dose of anti-hog cholera serum that is to be given with the virus is printed on the label of every bottle of anti-hog cholera serum that is sold. This is the minimum protective dose and usually more is given in vaccination or treatments. The mechanics of administering the serum and virus to pigs is easily mastered.

The difficulty in vaccinating hogs is in being able to detect hogs that are not fit subjects for vaccination, in appreciating the dangers of the virus used in vaccination and in knowing how to handle the materials and instruments used in vaccination. Because these and other points have not been properly appreciated by all persons vaccinating hogs, there is almost as much hog cholera now as there was 40 years ago when the serum and

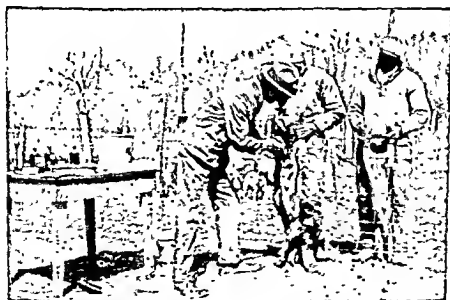


Fig. 6-3. Inoculating Pigs for Cholera. Note the way the pigs are being held. (Courtesy, USDA)

virus method of vaccination was announced by government veterinarians. Due to the difficulties attendant to the vaccination of hogs and the disastrous results that may follow if not properly done, it is recommended that a veterinarian or another competent person be employed to vaccinate the animals.

The time to vaccinate pigs with the double, simultaneous, or serum and virus method has been the subject of much debate among authorities. It is the general opinion, however, that pigs can be vaccinated very satisfactorily at six weeks of age. At this time the pigs are small enough to make the vaccination



Fig. 6-4. Making the Injection. This is one of the important steps in immunizing hogs against cholera. (Courtesy, USDA)

economical, they do not suffer as much from the reaction that follows vaccination as older hogs do and it is easier to handle small pigs. Since the virus is eliminated by vaccinated pigs following the use of serum and virus all unvaccinated pigs should be treated at the same time. Neighbors owning pigs should also be told when hogs on a given farm are to be vaccinated.

Pigs that are vaccinated should be confined in a clean, dry pen with good fences. If they are muddy, straw or hay bedding that is dry will help to clean them off. They should be kept up for 12 hours before treating. Following treatment the feed should be reduced for two weeks at the end of which time the pigs can be brought back gradually to full feed.

Serum and virus vaccination, even when properly done, will cause a lowering of a pig's resistance. Any diseases that the pig may have been harboring but keeping under control with his normal resistance will usually break out and make the pig sick following this type of vaccination. The lowered resistance of the pig following vaccination makes it especially important to protect it against exposure to other diseases at this time. "Flare-ups" of other diseases following serum-virus treatment are often called "vaccination breaks" as they appear from 7-14 days following vaccination.

The warnings listed above should not lessen confidence in serum and virus vaccination. The immunity produced against hog cholera by serum and virus vaccination is one of the strongest immunities known to medical science. The vast majority of hogs vaccinated by this method show no visible effects, suffer no secondary infections, and are solidly immune to cholera.

Hog Cholera Vaccines: Authorities are generally agreed that hog cholera cannot be eradicated from this country, as have many other highly infectious diseases, unless the use of hog cholera virus is eliminated. As a result, research workers have developed hog cholera vaccines. These products will protect hogs against cholera for at least six to eight months and are incapable of causing hog cholera. The two vaccines are known as crystal violet vaccine and Boynton's Tissue Vaccine (BTV), or merely as tissue vaccine. They have several advantages and disadvantages which are listed below.

Advantages

1. The use of live virus is eliminated.
2. There is no reaction period following vaccination.
3. Post-vaccination flare-ups of other diseases as the result of vaccination are eliminated.
4. It is not necessary to reduce the feed of the pigs before or after vaccination. As a result they can be marketed sooner.
5. The same size dose of vaccine is given to hogs of all sizes, thus making vaccination cheaper for heavier hogs.
6. Since there is no danger of cholera spreading to unvaccinated hogs following vaccination it is not necessary to vaccinate all of the pigs at one time. Any part of the

herd can be treated whenever they get old enough and the others left until they reach vaccination age.

7. By the universal adoption of this method of vaccination and the elimination of the use of virus it should be possible to eradicate hog cholera.

Disadvantages

1. The immunity produced is not as long lasting as that produced by serum and virus, hence breeding stock must be revaccinated each year.
2. Pigs should not be vaccinated until 10-12 weeks of age or two weeks after weaning.
3. It takes two or three weeks for pigs to develop an immunity following vaccination.
4. Vaccines cannot be used safely if cholera is present in the neighborhood or if the pigs have been exposed to cholera.

Serum Alone Treatment: In this method the anti-hog cholera serum is used without the virus. It will give immediate protection against cholera for a period of 10 to 21 days. It is used largely for emergency treatments until more permanent measures can be taken.

"New" Safe Vaccine: Since 1951 there have been available commercially (licensed by USDA) some "safe" vaccines for preventing cholera. They are called safe because the live virus does not give the vaccinated animal the cholera as in the old virus-serum method of treatment. Researchers discovered a way to first inject the virus into rabbits. This weakens the virus and thus may be called a safe vaccine.

Authorities differ as to whether anti-hog cholera serum should be used along with the new vaccine. In fact, some companies making the vaccine recommend the use of the serum while others do not. On the other hand, some veterinarians use the serum whether or not the manufacturer recommends it.

Some authorities believe that the widespread use of this new, safe vaccine will eliminate hog cholera. Others think that possibly over a longer period of time some unseen disadvantages of the vaccine may develop. Ensminger¹ sees the following advantages of this method of vaccinating for hog cholera, based on field tests and research:

¹Ensminger, M. E., *Swine Husbandry*, Interstate, Danville, Illinois.

1. Gives immunity without producing an active case of cholera in the animal or bringing the infection on the farm.
2. Gives early protection against cholera. If used with serum gives immediate protection. Takes about 7 days with the vaccine alone. (Some authorities suggest 3 to 5 days.)
3. Lessens the hazard of secondary infections which frequently followed the old virus-serum method.
4. Gives long-time immunity, perhaps lifetime, though not certain about this point.

SWINE ENTERITIS

Salmonella Infection: This disease is also known as "enteritis," "necro," or "necrotic enteritis." It often appears simultaneously with pneumonia and the two diseases are referred to as pneumonia-enteritis complex, swine plague, or hemorrhagic septicemia.

Salmonella infection is caused by a bacteria, or germ, called *Salmonella choleraesuis*. It can appear as an acute disease that is difficult to distinguish from hog cholera and other acute diseases but more often it appears in a sub-acute or chronic form commonly known as necrotic enteritis. Other disease producing agents combine with the Salmonella germs to produce the chronic form of the disease.

In the chronic form the pigs have diarrhea at the outset and are rather sick, showing more or less the symptoms described under acute diseases. There is a rapid loss of weight and the pigs get a "tucked-up" appearance in the flanks. Pigs that survive the initial attack of the disease eat lots of feed but do not put on flesh. Their head, ears, and legs grow, causing them to be known as "race-horse pigs." Pigs in such herds die at a slow but regular rate that is very disheartening to the owner. Obviously, these pigs are not profitable and should be sold for tankage.

This infection often appears in pigs that have been recently vaccinated with serum and virus following long hauling and exposure to various diseases in public stock yards that have not been properly disinfected. In the purchase of feeder pigs it is best to know the source of the animals so that one can have some idea about the disease status of the pigs.

The pneumonia-enteritis group of diseases has a tendency to live over in the soil, especially in permanent hog lots and in low, wet places. After the disease appears in a group of hogs in a certain field, the field should be cultivated and exposed to the sun before hogs are put on it again.

Prevention: Hogs can be vaccinated against *Salmonella* infections and the pneumonia-enteritis group of diseases. Bacterins are used for this purpose and are often given to pigs by veterinarians at the same time they are vaccinated against cholera. One should remember that bacterins require a period of time to develop any immunity in animals; therefore, no immediate protection is obtained from bacterins.

Other Types of Enteritis: Enteritis is also caused by several other types of disease producing agents. These include:

1. Vitamin deficiencies.
2. Very tiny disease producing agents called viruses.
3. Little one-celled organisms called protozoa.
4. Bacteria other than *Salmonella choleraesuis*.
5. Poisons—either metallic poisons, plant poisons, or other toxic materials.
6. Enteritis as part of the symptoms of other diseases.

In the initial period of most of the above listed types of enteritis the symptoms are very similar to *Salmonella* infection. Due to the complexity of the enteritis group of diseases and the urgency of starting proper treatment at once it is important to secure the services of a competent veterinarian to make a diagnosis and administer the proper treatment.

PNEUMONIA

Pneumonia in hogs is most often caused by a bacteria called *Pasturella suisepitica*. This disease is also called hemorrhagic septicemia and swine plague by some farmers and veterinarians. This condition can appear by itself but is most often seen in conjunction with some other disease such as enteritis.

Animals affected with acute pneumonia breathe rapidly with short breaths. In chronic pneumonias the pigs may develop a jerky type of breathing called "thumps."

Hogs with pneumonia should be placed in dry quarters protected from the weather and encouraged to eat. Pneumonia usually appears as part of another disease.

ERYSIPELAS

This disease appears in acute, mild, and chronic forms. It is caused by a bacteria that lives for long periods in the soil. Hogs ill with acute erysipelas show many of the symptoms of an acute disease already described and often die in three days or less after becoming sick.

Mild swine erysipelas is similar to the above but the hogs are not quite as sick and usually recover in two weeks. Skin lesions (sores) are common in this form and areas of skin on the back or sides get red, become dry, hard and raised and may come off, leaving a large raw area. The ears and tails of pigs are often involved in the mild form. The ears become wrinkled and hard and often have scabs on them. The edges of the ears even slough off. Part, or all, of the tail may drop off.

Hogs that recover from either the acute or mild types may develop chronic swine erysipelas. These pigs often have swellings of one or several joints of the legs. Others become very thin and although they eat well, do not gain. They resemble chronic enteritis pigs in this respect.

Prevention: Due to the fact that the germ causing this disease lives for long periods in the soil and is probably carried by apparently normal hogs it is often difficult to eradicate from a farm. The fact that it can be carried by a sow to her litter makes ear marking of pigs important so sows that carry erysipelas and other diseases can be identified and slaughtered.

A method of vaccinating pigs against swine erysipelas using serum and a culture of live erysipelas germs has been developed for use on farms where the disease exists. This is similar to the double treatment of pigs for cholera. Animals treated by this method are usually immune for at least six months. In some states special permission must be obtained from the State Veterinarian to use this method of vaccination.

Hogs sick with erysipelas or exposed to it can be treated with the "serum alone" treatment. This will protect them for two or three weeks, but at the end of this time the disease is apt to recur.

As this disease can infect people care should be taken in handling sick animals and carcasses.

SWINE BRUCELLOSIS (BANG'S DISEASE)

This is principally a breeding disease of swine caused by a germ closely related to the germ causing Bang's disease of cattle. It is spread chiefly by an infected boar at breeding time. The disease causes the following symptoms in affected animals:

1. Birth of stillborn or weak pigs.
2. Sterility (non-breeding) of sows.
3. Swollen joints of the legs or infection of the backbone, causing varying degrees of paralysis of the hind legs.
4. Abortion or birth of the pigs before they are fully developed.
5. Enlarged sex glands in the male, with possible sterility.

Control: This disease can be eliminated by selling all the hogs and starting over with animals that are known to be free of the disease. If this is done the new stock should be put on clean ground and all hog houses thoroughly disinfected. If this is not possible at least one crop should be cultivated on the ground before hogs are allowed on it.

The disease can also be controlled or eliminated by a system of blood testing. A specific program of blood testing should be developed and carefully followed. Blood test every 6 months at start of breeding season. Any reactors should be marketed. A retest should be made in 30 to 90 days and again, all infected animals sold. Repeat this procedure until all hogs are free from the disease. Buy other animals only from herds following the same blood-testing program with all reactors eliminated.

There are no drugs available that will cure a hog affected with Bang's disease, nor is there any effective method of vaccination.

This disease can be contracted by people and is then known as undulant fever. Great care should be taken in handling material from sows at farrowing time, in slaughtering hogs from infected herds, or in castrating infected boars or pigs.

INFLUENZA

Hogs are affected by influenza very much as are people. In hogs, the disease is caused by a virus and a bacteria acting together.

In hogs, influenza is an acute, rapidly spreading disease that

affects the whole herd in two or three days. The animals are very sick and show symptoms described under acute diseases.

Swine affected with influenza are sick five or six days and usually recover, unless complications set in.

There is no effective vaccination available for treating swine against influenza. Affected animals should be given good general nursing care such as providing clean, dry bedding in a place protected from the weather and plenty of fresh clean water and air.

VESICULAR EXANTHEMA (VE)

This is a virus disease that has caused tremendous damage in recent years. In 1953 more than 150,000 hogs were infected with VE. The major cause for the spread of the disease is through the feeding of raw garbage to hogs which are then mar-

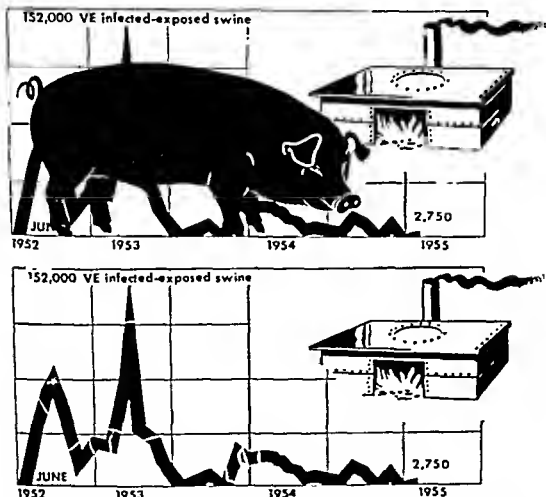


Fig. G-5. It is hoped that VE will be only history in the hog business. It took strong, cooperative action to reduce this disease. (Courtesy, Agricultural Research, USDA)

keted. The seriousness of the disease caused most states to pass laws regulating the feeding of garbage. Some growers have been convicted in court and have lost their right to raise hogs because they feed raw garbage—untreated or uncooked.¹

Recommended practices for the VE control program, as reported by the USDA, are as follows:

1. Quarantine infected and exposed hogs
2. Prompt disposal of infected and exposed hogs
3. Clean and disinfect infected premises
4. Cook garbage to be fed to hogs
5. Periodic inspection of feeding plants
6. Control the movement of garbage-fed hogs
7. Inspection of garbage-fed hogs at public stockyards
8. Clean and disinfect vehicles and facilities used in the interstate movement of hogs.

Tests for detecting VE have not been entirely satisfactory. This is due to the fact that it requires several days to obtain results of test. It is expected that a much more rapid method of testing for VE will be available within the near future.

SUMMARY

All farmers who grow hogs will have the problem of disease control. The problem can be kept under control by the alert farmer "with an eye for his hogs."

An ounce of prevention is worth a pound of cure. A program of disease control is the best answer. The key to the program is prevention.

Sanitation, vaccination, and feeding (particularly green grazing) are important elements in preventing disease.

Diagnosis of a disease is a job for the veterinarian. However, the successful hog grower must be able to detect the first sign of disease. If he waits until his hogs are sick it may be too late to call a doctor. The key things to watch for are feed and feces. If the hog goes off feed or if feces change then the animal may have some disease and should be isolated and watched carefully.

Hog cholera is still a major disease. Every hog grower should try to prevent cholera by a sound program of vaccination. How-

¹The state laws usually do not apply to the farmer who feeds his own household slop to hogs to be consumed by his own family.

ever, he should also know the first signs of the disease and act at once. There are several other diseases with similar symptoms, but the safe thing is to call a veterinarian at once if cholera is suspected.

PROBLEMS AND ACTIVITIES

1. What are the two types of hog diseases?
2. Explain the importance of prompt diagnosis of acute diseases.
3. What are some of the symptoms of acute hog diseases?
4. Make a list of the acute hog diseases.
5. Explain the several methods of vaccinating hogs against cholera.
6. What steps should be taken before pigs are vaccinated by serum and virus method?
7. What are the advantages and disadvantages of hog cholera vaccines?
8. What is Salmonella infection? How may it be prevented?
9. How may swine be treated for pneumonia?
10. How may swine erysipelas be prevented?
11. What control measures should be used in combatting Bang's disease in hogs?
12. Can swine influenza be controlled by vaccination?
13. What is VE disease of hogs? Does your state have any laws relative to this disease?
14. Arrange for an experienced veterinarian to discuss control of swine diseases with entire class.

CHAPTER 7

Controlling Internal Parasites

For many years farmers have recognized internal parasites of hogs as serious pests. In attempting to combat them, hog producers have applied many worthless remedies. They have often applied remedies not recognized by authorities in the U.S.D.A. and the agricultural experiment stations.

The purpose of this chapter is: (1) to give hog producers a sound basis of judgment as to the methods of combatting or controlling each of the more important internal parasites of hogs, and (2) to indicate in detail the practices that scientific investigation has found to be the most effective in controlling these pests.

Before any one of these parasites can be intelligently combatted, the hog grower should have a clear understanding of how each parasite develops and where it lives, stage by stage, from the egg to adult worm. When this life cycle, or "life history," as it is called by scientists, is definitely known, then and only then can plans be made to break the life cycle at some point that will destroy the growth and development of these parasites. Therefore, the life history of each of the more important of these parasites will be considered carefully in order to discover at what point in the life of each, the cycle may best be broken, and by what methods this may be accomplished.

I. LIFE CYCLES OF INTERNAL PARASITES

The Kidney Worm: The kidney worm is one of the most serious obstacles to profitable hog production in the South. Since parasites of this kind are found in the liver, kidney fat, kidney tissue proper, blood vessels, and other parts of the body outside the digestive system, they cannot be removed by any known medicinal treatment. Larvae of the kidney worm are prevalent on hog pastures in practically all the Southern states.

Heavily infested hogs eliminate thousands of kidney-worm eggs daily with the urine. The microscopic eggs develop on pastures, in hog lots, in barns, near fences, along the sides of build-

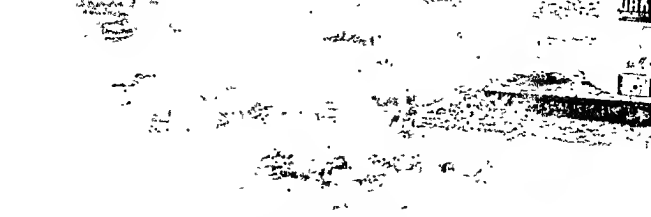


Fig. 7-1. Good hogs in an area lacking drainage. Worms and other parasites get started easily. Sanitation is difficult.

ings, in fact, in any location which affords moisture and shade. During the warm months, the eggs hatch in about 24 hours after they have been deposited on the ground with the urine. During the early spring and late fall months, the period required for hatching may be prolonged to two or more days. Freezing temperatures destroy life in kidney-worm eggs in about 24 hours. The summer months and the warm spring and fall months are, therefore, most favorable to the propagation of kidney worms, and during these periods the larvae which emerges from the eggs develop to the infective stage in from 4 to 6 days after hatching.

Hogs become infested with kidney worms by swallowing the infective larvae with forage or dry feed that has become contaminated with them, and by rooting and hunting for feed in litter which is allowed to accumulate on pastures and in lots. Kidney-worm larvae can enter the bodies of hogs through the skin also, especially when it has been broken by rubbing or scratching or has been injured by fleas, lice, mange mites, or ticks, or in some other way. Regardless of the way in which the larvae enters the body, they get into the blood and are carried to the liver, lungs, and other organs. The liver is their preferred location during the early stages of their life in swine. The worms make their way to the surface of the liver and thus get into the abdominal cavity.

At this stage the worms are from about one-third to one-half grown. Their wandering in the body cavity brings them to various other parts of the body including the loin muscles, in which they frequently become embedded. Those worms which get into the kidney fat, however, are the ones that produce the eggs that are eliminated with the urine. In the kidney fat the worms hollow out tunnels which lead to the ureters, two slender tubes connecting the kidneys with the bladder. They

also puncture the ureters, thus providing an avenue for the escape of the eggs to the bladder. Some of the kidney worms bore into the kidneys, and this procedure also affords an outlet for the eggs to the bladder. When an infested hog urinates, it discharges the kidney-worm eggs which have accumulated there.

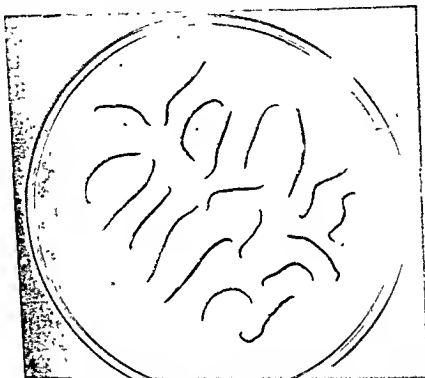


Fig. 7-2. Kidney Worms. They cannot be removed from a hog by any known medicine. The only way to control them is by prevention. (Courtesy, USDA)

The time required for kidney worms to develop to egg-laying maturity in swine is about 6 months.

This life history suggests how the life cycle of kidney worms may be broken and these worms controlled: "Keep pigs away from old hog pastures, hog lots, or any damp shady places where infested hogs have urinated." This is practical sanitation. There is no known treatment for kidney worms.

The Lungworm: Lungworms are among the most injurious parasites occurring in hogs and they have a peculiar life history.

Lungworms are whitish, threadlike roundworms, from about $\frac{1}{2}$ inch to 2 inches in length, and from about 1-25th to about 1-12th of an inch in width. These parasites occur occasion-

ally in the windpipe but usually in its two main branches, known as the primary bronchi; in the ramifications of these bronchi; and in the finer terminal branches of these ramifications, known as the bronchioles. In these locations lungworms are often present in numbers sufficient to plug the smaller bronchi and bronchioles and interfere with normal breathing. When lungworms accumulate in large numbers, usually in the finer bronchi and bronchioles along the lower borders of the lungs, they produce a localized pneumonia.

Although older pigs can and usually do survive a condition of this sort without much evident discomfort, young pigs may be seriously affected by lungworm infestation and may die as a result of it.

Lungworm infestation in pigs is characterized by a cough, especially in the early stages. This is due to irritation of the delicate lining of the windpipe and its branches produced by the arrival of the wandering worms in the lungs and their subsequent migration there.

The Life Cycle Begins: Pigs that are moderately or heavily infested with lungworms discharge incredibly large numbers of eggs with their droppings, especially during the period of infestation when the reproductive capacities of the parasites are high. The eggs can be seen only with the aid of a microscope. In experimental infections insufficient to produce very marked symptoms in pigs, it was estimated that as many as 3 million eggs were eliminated in the droppings of one pig during a period of only 24 hours. This estimate by investigators was based on careful counts of the number of eggs present in a definite quantity of feces.

The eggs, like any other small foreign bodies, are expelled from the lung of infected pigs through the action of cilia (minute whip-like projections) that protrude from the cells lining the windpipe and its branches. The eggs are moved upward in the lungs by the action of these cilia; in this way they reach the back of the mouth (pharynx) and are then swallowed. The hard shells resist the action of the digestive fluids as the eggs move down the stomach and intestine. They are finally expelled from the intestine with the feces.

Each normal egg expelled with the feces of infested swine contains a larva (young worm) moving within the shell rather sluggishly. The movements do not rupture the shell, as happens

in the case of thin-shelled eggs of other parasitic roundworms. The hatching of the lungworm eggs and the further development of the parasite take place in the bodies of earthworms, or angleworms, which swallow the feces containing these eggs.

Earthworms Eat Lungworm Eggs: Earthworms usually abound in hog lots and in permanent pastures in which manure accumulates. They feed and thrive in the dung of all kinds of animals and swallow lungworm eggs which are present in swine feces infested with these eggs. Investigators of the United States Department of Agriculture and others have found that earth-



Fig. 7-3. Earthworms or "Fish Bait." They eat lungworm eggs. Hogs become infested with lungworms from eating earthworms. (Courtesy, USDA.)

worms collected in old hog lots and on permanent ill-kept pastures showed a high rate of infestation with lungworm larvae in various stages of development. More than 2,000 larvae have been obtained from a single earthworm collected in a hog lot in one of the southern states. The larvae are present in the blood system and in the wall of the upper portion of the gut of earthworms. They remain alive in earthworms for months and are found in them at all seasons of the year.

Hogs Become Infested by Eating Earthworms: Hogs can become infested with lungworms at any time, provided they have access to infested earthworms. Because of their rooting

habits, pigs bring earthworms to the surface. As is well known, pigs eat earthworms, which constitute apparently, a choice morsel in their diet. The swallowing of even a single heavily infested earthworm is likely to produce a marked infestation with lungworms in a young pig.

The lungworm larvae present in earthworms are liberated in the pig's stomach and intestine by the process of digestion, and the tiny worms, once they are free in the intestine, bore into the delicate lining of the intestinal wall, move along with



Fig. 7-4. Roundworms or Ascarid. They often become so numerous that they almost congest the small intestines of pigs. (Courtesy, USDA)

the lymph stream, get into the blood, and are carried to the lungs. Here they leave the delicate blood vessels, enter the air spaces of the lungs, and move up into the ramifying branches of the air-tube system of the lungs, where they settle down and develop to fertile maturity in about 4 weeks. Mature female lungworms produce most of the eggs during the first 3 to 4 months of the fertile period.

Investigators have found no way of removing lungworms by medical treatment of any kind. The foregoing study of the habits of the lungworm, however, suggests the way to break

the life cycle: "Keep pigs out of places where they can get earthworms or 'fish bait' to eat!" This is only common sense, but it comprises practical sanitation. Lungworms cannot be removed from hogs by drugs.

The Roundworm or Ascarid: The common roundworm is one of the most injurious of the various kinds of parasites that infest pigs. It causes digestive troubles, retards growth and development, and in other ways interferes with the well-being of pigs, especially the younger animals. While still of microscopic size, the worm travels in the blood stream from the intestine to the lungs and then back to the intestine by way of the windpipe and esophagus. This circuitous journey requires about 10 days for its completion, after which the young worm settles down in the small intestine and grows to maturity in about 2½ months.

If many of the young worms take this trip at the same time, as often happens, the injury that results is liable to be serious. The pig often shows symptoms commonly known as thumps, and may die of pneumonia. Probably most of the cases of thumps in little pigs are caused by worm infection. Pigs that survive a severe invasion of the lungs by the young worms frequently do not recover fully and fail to grow and develop at a normal rate. Bacterial complications, often with pus formation, sometimes follow the invasion of the lungs by the young worms, and these infections share the responsibility for the stunted growth of pigs.

Investigations and experiments have shown that young pigs are most susceptible to infection and suffer most seriously from the infection during the first few weeks of life. As they grow older they become more resistant, have fewer worms, and suffer less from both the young worms in the lungs and the older ones in the intestine. Therefore, little pigs require special protection.

Pigs become infected by swallowing the eggs of the parasite. These worm eggs are of microscopic size and are found in the manure of infested hogs or on and in the soil of places that have been occupied by infested hogs and hence contaminated by their droppings. It has been estimated that one full-grown female worm in the intestine of a hog may produce as many as 27,000,000 eggs. At the time they are passed out of the body of the hog in the droppings the eggs are not infective. But in a few weeks or months, depending on the weather and various other conditions, the egg develops to a stage at which it contains a tiny worm, and it is then ready to infect the pig which swallows it.

The eggs are very resistant to cold weather and drought; they are not killed by most chemical disinfectants, and are very long-lived. Some may live as long as five years. Not all adult hogs harbor intestinal worms, even though exposed to infested soil; commonly, however, the parasites may be found in one out of three hogs of breeding age.

From the foregoing it is evident that the soil of places occupied by hogs is likely to be heavily laden with the eggs of intestinal worms, and it is readily understood, in view of their food habits, how pigs kept in such places may become infested with large numbers of the worms. Worm-infested places are especially dangerous for young pigs. It is largely on account of roundworm infestations that so many young pigs are lost or fail to grow properly when reared under ordinary methods of hog management. All of these facts about the common roundworm suggest practical sanitation as the method of control: "Keep pigs out of worm-infested areas."

Treatment for Roundworms: Prevention and sanitation are preferred to treatment for worms. The careless use of lye and other "worm remedies" is not recommended. However, there is a safe and simple way to get rid of about 95% of worms in hogs if done properly. The recommendations given here are based on information from the North Carolina State College.

Hogs of any age may be wormed with this method. Perhaps the best time is about two weeks after weaning. However, some recommend worming before weaning and again after weaning if infestation is bad. Sows in the latter part of gestation period should not be wormed.

Sodium Fluoride is the drug to use. The commercial or technical grade, obtained from a veterinarian or drug store, should be used. It comes in powdered form and is *very poisonous*. It is usually colored pink, blue or green so that it will not be mistaken for flour or other food.

The essential steps in the treatment, which should be followed carefully, are as follows:

1. Reduce the daily feed of hogs to be treated the day before treatment. Do not starve the pigs.
2. Make a 1% mixture by mixing 1 pound of sodium fluoride with 100 pounds of dry feed. On a smaller scale this will be 1 level teaspoonful of sodium fluoride with one

pound of dry ground feed. In calculating amounts needed a good guide is that a 25-pound pig will eat about a pound of the feed mixture.

3. Give the amount of feed and sodium fluoride mixture that the pigs will eat in one day. At the end of the day carefully remove any uneaten feed and replace with regular feed.
4. Self-feed the mixture *DRY* only! *Never as a slop.*
5. Keep chickens or any other animals away from the feed mixture.
6. Provide plenty of clean drinking water for the pigs.
7. Do not treat sick pigs.

Plenty of trough space is needed. If a large number of hogs are to be treated, it is more satisfactory to divide them into lots of about the same size with not more than 20 pigs in each lot.

Other Treatments for Worms: Some new chemicals, called piperazine compounds, for treating wormy pigs were made available in 1956. Early tests indicate that they may be used in wet feed as well as dry feed. Not enough tests of these new compounds have been made by researchers to make a recommendation. Since these new drugs are being advertised in farm magazines, the hog grower should check with his veterinarian, vo-ag teacher or county agent before using them.

Thorny-Headed Worm:¹ Thorny-headed worms are milk white to bluish in color and cylindrical in shape, the largest being about the size of a lead pencil. The head is provided with a spiny proboscis (snout) by means of which the worm becomes firmly embedded in the wall of the gut. The attachment of the worm is so firm that it requires some effort to detach one from its hold.

The adult female worms produce numerous eggs which pass out with the manure. May beetle larvae or June bugs, commonly known as "white grubs," eat the eggs along with swine manure or with soil contaminated with the manure of infested swine. The eggs hatch in the bodies of the grubs and develop to a stage that is infective to swine. Pigs obtain and swallow the grubs by rooting in soil in which they occur. The young worms escape from the bodies of the grubs as a result of the process of digestion

¹U.S.D.A. Farmer's Bul. 1787: "Internal Parasites of Swine."

in the pig's stomach or intestine or both, settle down in the intestine, and develop there to egg-laying maturity.

No special symptoms have been attributed to infestation with thorny-headed worms, although these parasites are decidedly injurious. At the place of attachment to the intestinal wall a swelling or nodule appears; this is visible on the outer coat of the intestinal wall. Sometimes the injury is so deep that the intestine is perforated, which causes peritonitis, an inflammation of the delicate lining of the abdominal cavity. This condition is fraught with serious and often fatal consequences. These worms contribute also their share to the general unthriftiness that is nearly always associated with parasitic infestation and, in exceptional cases, may produce the serious condition already noted. The life cycle of the thorny-headed worm suggests a method of breaking the life cycle by keeping pigs from feeding in soil where they can obtain June-bug larvae.

II. CONTROLLING INTERNAL PARASITES

When a careful examination is made of the life history of each of the internal parasites infesting hogs, it appears that practical *sanitation* can be applied in specific ways for controlling each of these parasites. It is quite true, however, that the specific method of control in the case of one parasite is different from that of another. That is, if the common roundworm and the lungworm could be dealt with separately, the sanitary control methods with the one would differ from the other because hogs become infested with these parasites differently. But the facts are that both are prevalent and both must be controlled at the same time; pigs must be kept from eating roundworm eggs, and also from eating "fish bait." Likewise kidney-worm infestation comes about in a different manner from either of these two, but sources of kidney-worm infestation are ever-present and any practical method of internal parasite control in the South must deal with all of these worms at the same time.

The problem then becomes: "Can a practical method of parasite control be devised that will combat all of these parasites at the same time?" The answer is: "Yes, such a system has been devised."

Internal Parasites Can Be Controlled Economically: Evidence of such control is presented in the following table:

Table 8. Effects of Various Degrees of Control on Infestation.

Kind of Control	Hogs	Average Per Cent Infestation	
		Livers	Kidneys
No control	28	97	32
Poor set-ups	291	68	23
Good set-ups	125	15	4

U.S.D.A.

Fig. 7-5.

These data show that with no parasite control 97% of the livers were condemned; with poor control 68% of the livers were condemned, but with good control measures in effect only 15% of the livers were condemned.

From records on sanitary swine production in South Georgia 31 lots of hogs coming into the packing plant from 29 farms in Colquitt County cleared inspection as 100% free from internal parasites.

It has been shown that hogs produced under methods of parasite control on the farm make larger net returns to the producer than worm-infested hogs. The data in the following table were taken from records of a Georgia packing plant.

Table 9. Effect of Parasite Control on Net Returns.

No. Hogs	Number litters	Average pigs per litter	Per cent free from parasites	Net return per litter	Difference in net return per litter
105	14	7.5	62%	\$44.70	
172	23	7.5	95%	\$55.85	\$11.15

Fig. 7-6.

It might be well also to consider the fact that Southern packers are recognizing the importance of parasite control in pork production, and they are giving premiums above the market for hogs free from internal parasites. When a premium is procured, it adds to the net returns of the farmer.

Parasite Control by Sanitation: The primary reason that there is a parasite problem to be solved in raising hogs grows out of the fact that hogs, as well as other farm animals, soil

their own table. Since this is true any system of hog production which (1) reduces the concentration of feces and urine on the soil, (2) aids in the destruction of parasite eggs and larvae deposited with the excreta, and (3) discourages the accumulation of earthworms and May beetle larvae, will reduce the chances of parasite infection among the hogs occupying the area.

It is fortunate that investigators have proved that a single system of control can be set up which will make the completion of the life cycles of all of the damaging internal parasites of hogs more difficult and in many cases impossible, thus greatly reducing infection in hogs raised under this system.

The method which has been found effective in controlling the internal parasites as suggested in a Georgia publication, consists of the following procedures:

1. Select for a farrowing lot a well-drained area that has not been used for several years for raising pigs; but one that is suitable for growing a grazing crop. The selected area should be not less than one-third acre for each sow and litter. If the land is poor, not less than one-half acre per sow and litter should be provided.
2. Cultivate and plant this area to a suitable grazing crop such as oats or cattail millet for green grazing during the suckling period.
3. Clean and disinfect farrowing houses immediately before farrowing.
4. Wash sows thoroughly before putting them in farrowing houses.
5. Provide plenty of clean straw or other suitable bedding for sows.
6. Remove all manure daily from farrowing houses.
7. Remove soiled litter at least once a week, preferably more often.
8. Keep all hogs off the area used for farrowing lots except during the ten week suckling period in the spring and the ten week suckling period in the fall. The two four months periods between the two litters are necessary to keep the hog lots free of parasite infestation.

These measures if faithfully carried out will protect the young pigs from becoming heavily infested with internal parasites during the time they are with the sows.

9. After the pigs are weaned they can be further protected by keeping them on temporary pastures of ample size especially prepared for them, or on cultivated fields. They should be kept away from all older hogs and from all other swine except pigs from other litters of about the same age which have been raised according to the above method.
10. It is very important that the areas on which pigs are developed from weaning to marketing be free of hogs for part of the year. This can usually be accomplished by planting crops on the area either to be grazed or hogged-off by the pigs or field crops to be harvested.

This system will prevent continuous reinfestation of the soil with eggs and larvae of harmful parasites, reduce the number of intermediate hosts of swine parasites (such as earthworm and May beetle larvae), and cause a large part of the residual infestations in the soil to die out during the period the area is not occupied by swine.

SUMMARY

Worms and other internal parasites cause great losses in the hog business. In addition to the deaths caused by parasites, they cause hogs to be less thrifty, thereby reducing efficient gains.

To control and combat internal parasites, it is necessary to understand their life cycle. Control and preventive measures are of no value unless done at the proper stage of the life cycle.

Prevention is the best way to control some internal parasites. A sound program of sanitation is the key to parasite control.

Green grazing is an important phase of parasite prevention as well as good feeding practice.

Many methods are used in trying to control roundworms. Sodium fluoride is better to use than most of the home remedies or expensive commercial compounds. Before using any of the newer drugs now on the market, a check should be made with the State Agricultural College.

To be successful a hog grower must develop a year-round program for the control of internal parasites. Sanitation and prevention are two essentials in this program.

PROBLEMS AND ACTIVITIES

1. What is meant by *internal parasites* of hogs?
2. Why is it necessary to know the life cycle of a parasite before you know how to control it?
3. What is the relationship between parasite control and green grazing on temporary pastures?
4. What do earthworms have to do with parasites in hogs?
5. Write the Animal Husbandry Department at your State Agricultural College for the latest recommendation on controlling worms in hogs.
6. Work out a specific plan for controlling internal parasites in hogs on *your* farm. List *preventive* and *remedial* measures.

CHAPTER 8

Controlling External Parasites

External parasites cause considerable losses to hog producers, although the losses are not as direct nor as great as with diseases and internal parasites. For the most part the external parasites tend to lower the vitality of hogs—thus causing them to be less thrifty and more susceptible to disease. This is especially true of lice and mites.

In recent years screwworms have become a rather serious pest. Many hogs die as a result of screw-worm infestation.

It should be emphasized again that prevention is the most practical approach to controlling external and internal parasites. As pointed out in Chapters 6 and 7, the key to prevention is sanitation.

The hog grower can easily learn to detect the presence of external parasites. On the other hand, there is frequently nothing done about these parasites because their damage to the hogs is not readily noticed. Even the early damage from screwworms may be overlooked.

The efficient hog grower will keep watch for the appearance of these external parasites. With new chemicals available prevention and control are made relatively easy. However, a planned program of control, including regular spraying of animals and premises, is needed for most effective results.

I. CONTROLLING LICE

Life History: Hog lice are prevalent throughout the country and are found on most farms in the South where hogs are raised. Hogs rarely die from infestation of lice, but when heavily infested their vitality is lowered, which makes them more susceptible to diseases.

The hog louse is a suckling insect that feeds on both the blood and lymph of the animal. The full grown female louse attains a maximum length of about one-fourth of an inch; the male is somewhat smaller.

The entire life cycle is spent on the body of the hog. The eggs (nits) are deposited and cemented to the hair close to the skin. The favored locations of the nits are about the neck, lower sides, flanks and shoulders. The eggs hatch in from 12 to 14 days. (This period of incubation gives a clue to the frequency for treatments.) The young lice migrate to the tender skinned portions of the body. In colder weather the interior of the ears are favored locations for young lice. The female begins egg laying when 12 to 14 days old, and lives for a period of about seven weeks.

Control: Many methods of controlling lice on hogs have been found to be easily and economically applied. Some years ago the use of dipping vats and concrete wallows for treating large numbers of hogs was common practice in the South. Now, spraying with some of the newer chemicals is more economical, sanitary and effective.

Crankcase Oil: One of the old, simple ways of controlling lice and still used on many farms in the South is old crankcase oil drained from the car or tractor. Addition of a little kerosene for thinning makes it possible to use as a spray on hogs. However, it is more commonly put on the hogs with a scrub brush or old broom if the hogs are easily handled. Some farmers also wrap an oily sack around the hogs' favorite "scrubbing post" and keep it soaked in oil. The hog must be covered good, especially back of the ears and under the legs.

Many progressive hog growers are using some of the newer chemicals (described later) for controlling lice which also control mange. Oil does not control mange. Neither does the oil kill the eggs of the lice. Oil may also cause discomfort, even blister the hog if used in hot sunny weather. It is not satisfactory in very cold weather.

DDT: The proper use of DDT will give effective control of lice. It can be used as a powder for dusting on the hogs, or as a spray.

Directions on the package of DDT should be checked and followed carefully.

Perhaps the most common practice is spraying with 1½ per cent mixture of DDT. This takes one pound of 50% wettable DDT powder in 4 gallons of water.

Other Chemicals: There are several other chemicals that will give very effective control of lice on hogs. Since they will

also control mange they are discussed under that subject later in this chapter.

The adoption of such a "double-control" program for lice and mange will make it unnecessary to use the oil or DDT for separate treatment for lice.

II. CONTROLLING MANGE

Mange is a contagious disease of the skin. In some sections of the South it gives a great deal of difficulty, although it does not usually kill the hogs affected. It greatly reduces their growth and thriftiness.

The *parasite* causing the mange is what the hog grower must control. It is a very small mite, hardly visible to the eye. These mites burrow in the skin causing severe itching. This causes the hog to rub very hard against post, fence or any object to help relieve the itching. The mange usually starts around the eyes and ears, or underneath the body where the skin is tender.

Use of Chemicals: Several relatively new chemicals are being used effectively in the South to control hog mange. Perhaps the most commonly used are Benzene Hexachloride (BHC) and Lindane. Reports show that others are being used in some areas of the South.

Recommendations as to the exact mixtures to use for spraying hogs with the chemicals differ in some of the states in the South. Therefore, the hog grower should check with the Animal Husbandry Department of his State Agricultural College for exact recommendations. The local veterinarian, vo-ag teacher or county agent should have this information.

The following are chemicals being used in the South to control hog mange:

Benzene Hexachloride (BHC)

Lindane

Chloradane

Toxaphene

Rotenone

Recommendations for using these chemicals for controlling mange may contain precautions of concern to the hog grower. For example, one recommendation includes this statement:

"Do not use BHC within 30 days of marketing hogs."

All such recommendations should be checked and followed carefully.

III. CONTROLLING SCREWORMS

Life History: The screwworm larvae hatch from eggs laid by a fly about the size of the common house fly. These "screwworm" flies are bluish-green blowflies with three dark stripes along the back between the wing, and with a yellowish-red face.

The yellowish eggs are laid in irregular masses on the edges of wounds or blood spots. The eggs hatch in 8 to 12 hours into small maggots which promptly penetrate the wound, causing bleeding and pain. The maggots rapidly destroy the tissues and enlarge the wound, thus attracting more flies. Finally the vital organs are exposed or the poisons from the extensive wounds are absorbed and the animal dies.



Fig. 8-1. A "Screwworm" Fly. It is about the size of the common house fly and is bluish-green in color with dark stripes along the back between the wings, and has a yellowish-red face. (Courtesy, USDA)

There are two species of screwworm flies which can be distinguished only by a microscopic examination. One of these is a parasite that primarily attacks warm-blooded animals and it is usually the first to attack. The other species usually invades the wounds a little later, but the two may be present in the same wound. The maggots of certain other blowflies may also be found in wounds. These various blowflies breed in carcasses of dead birds and animals. The number of flies produced depends, of course, upon the size of the carcass. It has been estimated that the carcass of a horse, cow or large animal will breed about a million flies.

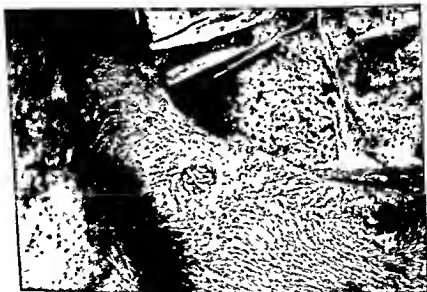


Fig. 8-2. A Pig Infested with Screwworms. Note the hole in the pig's leg with the live maggots in it. (Courtesy, USDA)

Screwworms will attack any warm-blooded animal. Sheep, cattle, hogs, goats, horses, mules, and dogs are infested in about the order named. Deer and other wild animals are frequently infested and people are also attacked. Exposed wounds in men may be invaded and the maggots are occasionally found in the nose, the flies being attracted by catarrhal conditions.

The place of attack in hogs is dependent upon the location and type of injury which attracts the flies. Any part of the animal may be infested. Newly born animals are often infested in the navel and not infrequently in the mouth around the teeth. Screwworm infestations often start from various injuries such

as scratches from brush, projecting corners or nails. Hogs are frequently infested around their ears and heads in injuries from fighting or from dog bites. The attack of other insects such as horse flies, horn flies, and especially ticks give rise to many screwworm cases. A large percentage of animals marked or castrated while screwworm flies are active become infested.

As a matter of fact, any injury or the presence of a scab or blood spot on the skin may give rise to screwworm attack.

Preventive Measures: With the life history of the screwworm in mind, several means of lessening the danger of infestation of screwworm on the individual farm and in the community may be followed.

1. Since the blowflies causing the infestation of screwworms develop in dead animals, it is essential that all carcasses about the farm and road-side be promptly destroyed, preferably by burning.

A large carcass can be burned by digging a trench back of the animal about 18 inches deep, and filling it with wood. Then turn the carcass onto the wood and make the fire. A quarter of a cord of wood will burn a large carcass.

2. Do not castrate pigs during the screwworm season. This season extends from about May 1st to November 15 in most of the South.

3. Control other external parasites to keep hogs from rubbing which develops sore spots through the skin. Sore ears, caused by rubbing due to lice or mites, should be avoided.

Treating Screwworm Cases: Each case of screwworm infestation should be brought into a limited enclosure for treatment, observation, and to aid in careful handling.

The presence of screwworms in a wound is usually indicated by a discharge of blood. The infested animal often has a "sick" appearance and may be seen trying to scratch or lick the wound. Badly infested animals tend to leave the herd. The yellowish egg masses of the flies are easily seen. Young maggots are not easily detected, especially in a large wound, but if the wound is observed closely their movement will be noted.

After many years of careful experimentation and testing, the U. S. Department of Agriculture has found that Formula MS 62 (commonly called Smear 62) protects wounds against infection as well as killing the screwworm larvac.

A more recent recommendation in some areas is EQ 335 Screwworm Remedy. A hog grower should check with the local veterinarian, vo-ag teacher, or county agent for the latest recommendations. One should not try to mix a "home remedy" for screwworms.

SUMMARY

External parasites are pests—to the hog and to the hog business. Losses due to external parasites are not as great as those due to disease and parasites. However, these pests cause pigs to be unthrifty and more susceptible to diseases.

Lice and other external parasites are easy to detect—if the hog grower trains himself to watch for them.

Prevention is easier, cheaper, and better than the remedy for external parasites on the hogs.

DDT and some of the other newer chemicals are very satisfactory in controlling external parasites. They should be used carefully and as directed on the package.

In using some chemicals, such as Benzene Hexachloride (BHC), special precautions may need to be taken. Some states have strong recommendations about these. State Agricultural College recommendations should be checked.

Screwworms have caused considerable damage to hogs in the South. The grower should learn to detect the appearance of this difficulty and act at once. Summer is the most favorable period for screwworms.

PROBLEMS AND ACTIVITIES

1. In what ways do external parasites of hogs cause economic losses?
2. In what ways do the life histories of hog lice, mites, and screwworms suggest methods of control?
3. Write the Animal Husbandry Department at your State Agricultural College for latest recommendations on controlling lice, mites, and screwworms.
4. Make a specific plan for controlling these external parasites on hogs on your farm.

SECTION III
PRODUCING PORK

CHAPTER 9

Feeding Hogs for Market or Slaughter

Pork makes up the bulk of the meat eaten by the people of the South. Some of the pork produced in the South is served as ham and bacon and in other forms on the tables of people in other sections of the nation. The quality of the meat depends to a large extent on the system of feeding and the feed consumed by the hogs.

Feeding hogs for market or slaughter is a very important job in hog farming. The cost of the feed and the length of time it takes to produce hogs that are ready for market or slaughter determine to a great extent just how profitable the enterprise will be.

This chapter deals with the problem of feeding hogs for market or slaughter. It includes the feeding program from the time the pigs are a few weeks old until marketed or slaughtered. In this chapter factual material—analyzed and interpreted—is presented that will give individual farmers a basis for developing adequate feeding programs on their respective farms, regardless of the section of the South in which they are located.

The following are the more important problems that should be considered in feeding hogs for market or slaughter: (1) concentrates to feed; (2) grazing crops to provide; (3) methods to use in feeding; and (4) rate of gain desired.

I. CONCENTRATES TO FEED

Feeds for hogs are generally classified as concentrates and roughages. Concentrates are high in digestible nutrients and relatively low in fiber. Grains, by-products of milling, tankage, peanut meal, cottonseed meal, and such feeds are classified as concentrates. Grasses, hay, green forage, and such feeds are roughages.

There are several systems of providing concentrates for hogs. They may be fed in self-feeders or hand-fed to hogs in dry lots or on permanent pastures; they may be hogged-off by

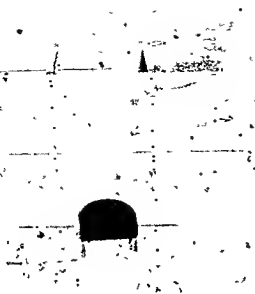


Fig. 9-1. A Self-Feeder. This self-feeder shows grain, protein supplement, and mineral mixture. (Courtesy, Extension Service, USDA)

the pigs in the field; or some of them may be hogged-off in the field while others are supplied in self-feeders as a supplement.

In either case the best kind and amount of concentrates to feed should be determined and provided for the hogs.

1. CARBOHYDRATES TO FEED

Value of Corn as a Feed for Growing Pigs: Corn has long been recognized as the basic carbohydrate feed for hogs. It is high in starch and low in protein and other ingredients. Corn should comprise the major portion of the ration for hogs. Since it is low in protein, mineral, and vitamins, corn should not be fed alone, but should be supplemented with other feeds.

Reports from many experiment stations in the South show that corn fed alone is not profitable. But when balanced with protein and minerals it ranks at the top as a feed for hogs. Many vo-ag departments have clearly demonstrated that feeding corn alone will not do the job.

Hog growers, who want to produce pork economically and efficiently, should not consider feeding corn alone to his hogs.

Yellow corn contains more Vitamin A than white corn. When other factors are equal, it should be fed to hogs. It is especially needed by pigs that are not receiving other feed containing adequate vitamins.



Fig. 9-2. Knowing how to feed out hogs caused this Texas Future Farmer to have the champion pen of barrows at the San Antonio Livestock Exposition. (Courtesy, Texas FFA)



Fig. 9-3. Corn is the base for good feeding of hogs. The agriculture teacher and student seem pleased at the prospect of a good crop of corn. (Photo by J. K. Coggin)

Shorts in the Ration for Pigs: Wheat shorts when added to the ration to replace part of the corn as a carbohydrate, slightly increases the daily gain. But since wheat shorts usually cost more than corn, net returns from feeding it are less than when corn is fed. Shorts may be fed profitably to small pigs to give them a thrifty start.

Too many farmers in the South have in the past depended upon "shorts" to do the complete feeding job. This feed alone does not give hogs a balanced ration.

Value of Oats as a Grain for Hogs: Many experiments on the value of oats as a grain for pigs have been made. The Illinois Experiment Station has run tests with mature oats in swine feeding on more than a thousand pigs. The results are summarized as follows:

1. For growing and fattening pigs, one-third of the grain ration may consist of oats without reducing the rate of gain.
2. Only when oats are as cheap per pound as corn will a ration of oats in any proportion produce as cheap gain as one in which the grain content is all corn.
3. Whole oats are not as profitable for pigs as ground oats.
4. Ground oats when mixed with corn as 1 part oats to 3 parts corn by weight has proved to be the most profitable proportion of oats and corn.

Other experiments support the above results.

Tests at the Georgia Coastal Plain Experiment Station show that mature oats when hogged-off are very satisfactory if supplemented with corn, protein supplement, and minerals. At the time of year when mature oats are available in the field, corn is usually scarce. When oats are hogged-off the expense of harvesting and threshing is eliminated, thereby making oats a profitable feed for hogging-off. At this station from 275 to 325 pounds of pork per acre are produced by oats that are hogged-off.

Other Grains for Hogs: Barley and Grain Sorghum are two other grains used in some areas as substitutes or as supplements to corn. On some farms these grains can be grown more easily than corn.

Relative Price of Grain: Since the feeding value and weight of grains vary, it is not always easy to determine the best buy

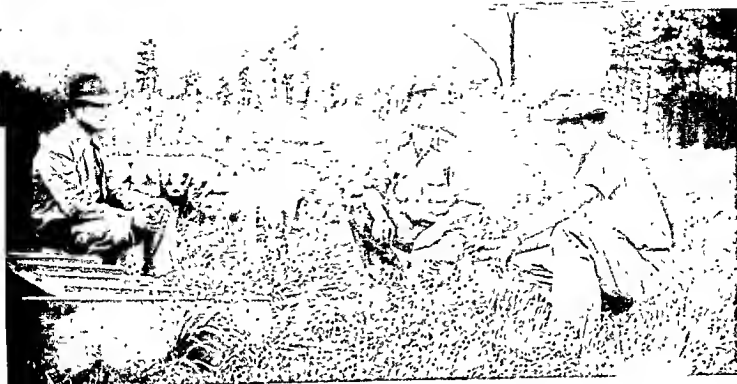


Fig. 9-4. Good pasture for his hogs is part of the program planned by this Alabama farmer. (Courtesy, Alabama Vocational Agriculture Program)

in grain for feeding hogs. For example, considering the weight and feeding value, oats are worth only about one-half as much as corn. That is, if corn is selling at \$1.00 per bushel, then oats would be worth 48 cents per bushel for feeding hogs.

The relative prices of corn and some other grains are shown in Table 10.

Table 10. Relative Price of Grain for Feeding Hogs.

If Corn Price Per Bushel Is—	Oats Per Bushel	Barley Per Bushel	Sorghum Grain Per 100 Pounds
\$1.00	\$0.48	\$0.78	\$1.61
1.10	.53	.86	1.77
1.20	.58	.94	1.93
1.30	.63	1.02	2.09
1.40	.68	1.09	2.25
1.50	.73	1.17	2.42
1.60	.78	1.25	2.58
1.70	.83	1.33	2.73

Prices of oats, barley, and grain sorghum, equivalent to specified levels of corn prices, after adjusting for differences in weight and feeding value.
—From *Agricultural Situation*, USDA.

Fig. 9-5.

2. PROTEIN SUPPLEMENTS TO FEED

The importance of protein supplements for growing pigs cannot be over emphasized. Experiments show that the daily gain of hogs has been made to more than double by the addition of protein supplements to the ration. They have also shown that

the feed cost is decreased when a protein supplement is fed. This results in higher net returns from hogs. (See Table 11—Protein supplement requirements for hogs.)

Table 11. Protein Supplement Requirement of Hogs.

Weight of animals	Percentage of protein needed in ration	
	Hogs on pasture	Hogs in dry lot
Pigs up to 50 pounds	18	20
Pigs 50 to 80 pounds	16	18
Pigs 80 to 120 pounds	14	16
Pigs 120 to 165 pounds	12	14
Pigs 165 to 220 pounds	10	12
Bred sows	12	14
Nursing sows	13	15
Breeding gilts and boars	13	15

—Georgia Extension Bulletin 535

Fig. 9-6.

There is apparently, however, a definite limit to the level of protein that can be fed most efficiently and economically. A few years ago, hog rations with 20% protein were used. Lower levels of protein have been found just as satisfactory and less expensive. Table 12 gives the details on carcasses from hogs fed two levels of protein at Ohio Experiment Station.

Table 12. Summary of Carcass Data from Hogs Fed Two Levels of Protein.

	Three Breeds		Crossbreds	
	High Level 18 and 15 per cent protein	Low Level 14 and 11 per cent protein	High Level 18 and 15 per cent protein	Low Level 14 and 11 per cent protein
Number of pigs	30	30	23	21
Av. Carcass weight (lbs.)	144.0	146.8	142.6	142.1
Av. Dressing percentage	70.3	70.43	69.95	70.20
Av. Length Carcass (inches)	28.4	28.4	30.1	29.9
Av. Backfat Thickness (inches)	1.76	1.84	1.63	1.66
Av. Lean Tissue Content (per cent)	37.15	36.38	39.08	38.06
Av. Fat Tissue (per cent)	48.97	49.97	46.61	47.94

Minnesota Experiment Station

Fig. 9-7.

At the same time it should be added that many commercial supplements for hogs are mixed for dry-lot feeding. Tests at North Carolina Experiment Station indicated that simple supplements fortified with vitamins, antibiotics and minerals were needed in dry-lot feeding but when hogs are on good pasture the fortification is not necessary.

There are two classes of proteins—(1) those from *animal sources* such as tankage, fish meal, milk, and meat seraps, and (2) those from *vegetable sources* such as peanut meal, cottonseed meal, soy bean meal, whole peanuts, and whole soy beans. Most authorities agree that vegetable protein fed alone does not give best results. It should be supplemented with animal protein. A mixture of several protein supplements gives better results than most single supplements, especially in dry lot feeding.

Value of Tankage as a Protein Supplement: When tankage is fed to hogs as a supplement to corn the daily gain is almost doubled and the cost of feed is greatly reduced.

The Illinois Experiment Station has found the net returns to be more than doubled by the addition of tankage as 10% of the ration.

Other experiments show that tankage increases the net returns from pork and should be fed in a proportion of one part tankage to nine parts corn by weight, when hogs are fed in dry lots. The amount of tankage in the ration may be reduced when hogs have abundant green grazing. The Mississippi Experiment Station has reported some poor results when tankage was used as a protein supplement. Other tests are being conducted to determine the cause.

When swine are "hogging-off" peanuts, soy beans, or other crops high in vegetable protein, some animal protein, such as tankage, should be fed as a supplement.

In feeding trials at Mississippi Experiment Station, pigs hogging off corn made very poor gains without a protein supplement. Daily gains increased from 0.50 to 0.86 of a pound when a protein supplement was added.

From Georgia comes the recommendation that pigs hogging-off corn should be fed a protein supplement, either commercial or home-mixed. If home-mixed there should be 40% tankage or meat meal, 25% soybean oil meal, 25% cottonseed meal or peanut meal, and 10% minerals. The mineral mixture is made of equal

parts of salt, bone meal or defluorinated phosphate, and limestone.

Value of Skim Milk for Hogs: Skim milk is a profitable source of protein. Pigs on feeding experiments have gained almost as much on an abundance of skim milk as those fed on tankage. Local prices of skim milk and tankage should be compared to see if any substitution would be profitable.

Skim milk as a by-product of a dairy is a very profitable source of protein for pigs. It should be fed with corn in a ration of about 2 parts milk to 1 part corn by weight in dry lot feeding. The amount of milk may be reduced slightly when pigs are on good pastures.

Skim milk is especially valuable for young pigs from 2 to 4 weeks of age. In addition to the protein content, skim milk is rich in minerals such as calcium and phosphorus. The proportion by weight of skim milk to corn for young pigs may be as high as 4 to 1. When pigs are older the proportion of milk to corn should be reduced. Good buttermilk has about the same feeding value as skim milk for pigs.

Value of Fish Meal for Swine: Experiment stations have carried on tests with fish meal as a protein supplement for swine. Results show that fish meal gives a slightly higher daily gain than tankage. Hogs fed the fish meal supplement consumed less feed per hundred pounds of gain than those on tankage.

Best results were obtained when fish meal was mixed in equal proportions with cottonseed meal. This is true when cottonseed meal can be bought at around one-third the price of fish meal. This mixture is excellent when pigs have access to green grazing. The ration for hogs should include by weight not more than one part fish meal to 9 to 12 parts corn. The fish meal should be of high quality or the pork is likely to have a fish flavor.

Value of Cottonseed Meal for Swine: Many experiments have been conducted to determine the value of cottonseed meal for hogs. Cottonseed meal contains a toxic compound called gossypol that is poison to pigs. Since the amount of this toxic substance varies in different meals it is unsafe to feed cottonseed meal in large quantities unless the gossypol has been removed by a chemical process. Studies have continued at Georgia Experiment Station as well as others in the use of cottonseed meal as a protein supplement for hogs. With new processes for extract-

ing the oil from the seeds and discovery of new facts of nutrition, it may mean that cottonseed meal will become as valuable source of protein for hog feeding as it has for cattle.

The Texas and Ohio Experiment Stations have found that cottonseed meal is a valuable protein supplement when it does not exceed 9 per cent by weight of the total ration. An excess of this amount has proved detrimental. Tests of the Georgia Coastal Plain Experiment Station show that a mixture of 3 parts tankage and 2 parts cottonseed meal proved a satisfactory protein supplement.

Value of Peanut Meal for Swine: Peanut meal is a very popular source of protein in the peanut belt of the South. Feeding results at the Alabama Experiment Station show that when peanut meal is fed in a proportion of 1 part peanut meal to 3 parts corn, it is just as profitable as 40% tankage. This is true when the price per ton of both is about the same. Peanut meal is low in minerals and hogs fed on it should have access to a good mineral mixture.

It has been found by many experiments that peanut meal should be mixed with tankage or fish meal in about equal amounts to give best results.

Soybean meal mixed with animal protein such as tankage or fish meal has been found very satisfactory as a protein supplement.

Value of Peanuts for Swine: Peanuts as a source of protein when fed in a dry lot have not proved very economical. However, excellent results are obtained when peanuts are hogged-off, provided they are supplemented with tankage or fish meal. Further information on hogging-off peanuts is given in the discussion of grazing crops for hogs.

Value of Garbage as Feed for Hogs: Many people have tried feeding garbage or other waste material to hogs. This may be done only under certain conditions. First, it is necessary to follow regulations about use of such materials as hog feed. Some states have strictly enforced laws on this matter. Furthermore, a check should be made with public health authorities to be sure that no rules are violated.

In special situations appropriate use of waste materials can be used very effectively. A hog boy near Montgomery, Alabama made nice profits feeding his hogs unsold potato chips.

In any case, such feeding of waste materials should be part of a balanced ration. If this is not done the "free" materials may prove to be an expensive way to feed hogs.

3. MINERALS TO FEED HOGS

It is a well-known fact that pigs need certain minerals such as calcium and phosphorus for bone building and other purposes. Many feeds produced in the South are low in mineral content—some more than others. For this reason it is advisable to keep a mineral mixture before the pigs at all times.

There are a number of mineral mixtures that have given good results. The hog grower should secure the recommendations for mineral mixtures from his state agricultural college. Not only do these recommendations differ by states but by areas within a state. The proper mineral mixture for a particular area should be used rather than just any mineral mixture.

Feed Required to Produce a Market Hog: Professor Fred Hale, Texas A and M College, says that every hog grower should have a goal to shoot for in producing market hogs. One important yardstick to help measure efficiency is in the amount of feed required for hogs at different stages of their growth. Feed cost—with good gains—must be kept as low as possible. The combination of good rates of gain at lowest possible cost means the most profit.

Some "feeding goals" or yardsticks to measure feed required are given by Professor Hale in Table 13.

Table 13. Feed Required to Produce a 210-Pound Market Hog While on Good Pasture.

<i>Feeding Period</i>	<i>Grain Lbs.</i>	<i>Protein Feed Lbs.</i>	<i>Mineral Lbs.</i>	<i>Total Feed Lbs.</i>
Sow (Gestation) 114 days	589	100	10	699
Sow (Suckling) 60 days	550	100	10	660
Pigs (Suckling) 8 pigs per litter	237	80	4	321
TOTAL	1376	280	24	1680
Per Weaning Pig, 8 per litter	172	35	3	210
Per Pig, 60 to 90 days	81	18	1	100
Per Pig, 90 to 180 days	500	77	8	585
TOTAL*	753	130	12	895

*Where green grazing is not available to the sow during gestation and for the sow and pigs until weaning, the feed requirements will be about 15% more.



Fig. 9-9. Mature Corn Being Hogged-Off. Experiments show that hogs gain more economically if allowed to run in the fields and harvest the crops themselves.

II. CROPS TO PROVIDE

There are many reasons why good pastures should be provided for hogs. Agricultural experts in one state have listed the following ten advantages:

1. Saves about 15% of grain needed
2. Saves up to 30% of protein feed
3. Saves minerals
4. Increases flow of milk for sows
5. Helps prevent diseases
6. Helps prevent worms
7. Requires less labor to care for hogs
8. Provides exercise for hogs, especially valuable to sows
9. Manure is in fields rather than wasted in hog lot
10. Reduces time required to produce hogs for market or slaughter.

There are two systems that might be used in feeding hogs on crops for green grazing and hogging-off purposes. One system



Fig. 9-10. Plenty of supplement and water for these hogs while they clean up the fields result in economical gains. (Photo by J. K. Coggin)

provides for carrying animals along during lean feeding periods and then fattening them during seasons when feed crops are abundant. The other system provides plenty of green grazing and feed crops to be hogged-off from birth to market. The former system requires from 10 to 14 months to produce a number one hog. The latter system, if supplemental feed is provided, will produce a number one hog in six to seven months.

It is the purpose in this chapter to present a system of providing green grazing and mature feed crops for feeding out hogs in 6 to 7 months. Such a system makes it possible to grow two litters per year from each sow. The breeding program must be fitted into the feeding program to enable this system to function.

1. GREEN GRAZING CROPS

Green grazing crops for hogs are divided into two classes—(1) permanent pastures, and (2) temporary grazing crops. It is possible to have permanent pastures for all sections of the South. However, in most sections it is necessary to supplement permanent pastures with temporary grazing crops.

In the main swine producing areas of the South, it is possible to have a year round program of temporary green grazing crops. This eliminates the necessity of permanent pastures and aids greatly in the control of internal parasites. The mild climate and soil types permit a year round system of green grazing and hogging-off mature crops.

Fig. 9-11. Plenty of good pasture is part of this Future Farmer's hog program. He and his vo-ag teacher are pleased with the results. (Photo by J. K. Coggin)



Permanent Pastures for Swine: On some farms in the South, it is not practical to provide a year round system of temporary grazing crops. In such cases permanent pastures or a combination of permanent and temporary pastures may be provided.

Many experiments have shown that good permanent pastures increase the daily gain of hogs and decrease the amount of concentrates required for each 100 pounds of gain.

A permanent pasture, consisting of some basic grass such as Bermuda that is adapted to the climate and the soil, should be provided during the early spring and summer months. Clovers and lespedeza should be included in the pasture mixture. Latest recommendations from the State Agricultural College should be studied carefully to be sure of the best mixture of pasture grasses.

Permanent pasture grazing is helpful in providing protein, minerals, and vitamins that are so essential in pork production. Many feeding tests show that a good permanent pasture cuts the need for a protein supplement in half. Pigs have been found to make 50 per cent greater daily gains on the same concentrates when kept on a good permanent pasture.

Planning Needed: Good pastures for hogs can be had in any section of the South. However, it takes planning and the use of proper mixtures and good practices to have year-round grazing for hogs. Each hog grower will need to carefully plan in advance for needed grazing on his farm to meet his particular needs. It is important for a hog grower to check with the State Agricultural College for the seeding mixtures and other practices necessary for developing good pastures in his section of the state.

A grower might develop a plan such as the one outlined in Table 14. This pasture program for hogs is built around the Ladino Clover permanent pasture. Perhaps most Southern Experiment Stations will include a similar type of recommendation for planning the permanent pasture and temporary grazing in order for the hogs to have available green feed the year round. This is one of the big advantages that the South has in growing hogs and should be utilized to the fullest extent by hog growers in the South.

Grazing Crops—Spring Litters: Temporary grazing crops are those that are planted annually or seasonally and are grazed off by swine. The green grazing crops adapted for late winter or spring farrowed pigs are oats, rye, rape, cattail millet, sorghum, soybeans, velvet beans and cowpeas. With an adequate feeding program spring litters should reach number one market weight and finish by September.

The most important green grazing crops for spring litters are discussed below.

Green Oats: On good land oats can be grazed from November to May. Experiments show that pigs grazing on green oats gain much more rapidly than those fed the same ration without grazing. The amount of corn, tankage, and minerals for each 100 pounds gain is reduced 25 to 30 per cent when hogs are grazed on oats as part of the ration. It is not possible for oats to supply grazing for the entire period for spring pigs. They should be supplemented with other grazing crops. Oats should be planted for green grazing in the South in September and October. An acre of oats will furnish green grazing for from 8 to 16 pigs. Rye can be used instead of oats or a mixture of oats and rye may be planted.

Millet: Cattail millet is one of the most valuable green grazing crops grown in the South. Its value is due to the fact that it furnishes early summer grazing during the period when it is difficult to provide grazing crops for hogs. Hogs should be turned on millet when the plants are six to eight inches high. This early grazing stimulates stooling and greatly increases the carrying capacity of the crop. If properly pastured this crop will carry a large number of hogs on a small acreage. If two or three different plantings are made during March, April, and May the grazing period may last from May until September.

Table 14. Plan for Year-Round Grazing for Hogs.

Grazing Period		What to Seed	When to Seed	How Much	Fertilizer
Fall	Winter Spring Summer				
x	x	Ladino Clover	Aug.-Sept.	2 to 3 lbs.	Seeding 800 lbs. 2-12-12 Topdress 500 lbs. 0-10-20
x	x	Small Grain	September	Rye—1 bu. Oats—1 bu. Barley—1 bu.	400 lbs. 8-8-8 *Topdress 20 lbs. N. in Feb.
x	x	Oats Rape Lespedeza	Feb.-March	Oats—3 bu. Rape—3 lbs. Lespedeza—20 lbs.	400 lbs. 8-8-8
x	x	Lespedeza (Seed on Small Grain)	Feb.-March	30 pounds	400 lbs. 0-14-14
x	x	Ryegrass Crimson Clover	September	Ryegrass 15 lbs. Crim. Clover 15 lbs.	400 lbs. 8-8-8 *Topdress 20-30 lbs. N. in Feb.
	x	Soybeans	Apr.-June	1 bushel in rows	400 lbs. 0-10-20
	x	Rape	Feb.-March Aug.-Sept.	8 to 10 lbs. broadcast	400 lbs. 8-8-8 *Topdress with 30 lbs. N.

* Remove animals when topdressing is applied until after a rain.

Fig. 9-12.

Sorghum: It is generally thought that green sorghum is not as well adapted for hogs as some other crops. However, early plantings of sorghum will furnish grazing during June and July. The following are some of the advantages of the crop: (1) it is adapted to practically all soils of the South; (2) it is a drought resistant crop and is easy to grow; and, (3) it produces abundant seed that can be saved on the farm. Early amber is planted for early hog feed. Orange yields heavier and extends over a longer period.

Soybeans: Soybeans produce excellent green grazing for hogs. If the grazing is rotated, the soybeans will produce green grazing from June until October. The fine stemmed late maturing varieties are generally considered best for green grazing. Most soybean varieties do not have a wide adaptability so that the better varieties for some sections of the South might not necessarily be the best varieties for other sections. Soybeans should be planted in two to three foot rows and cultivated. The soybean is a legume, which means that the leaves and fine stems furnish a green feed with rather high protein content.

Kudzu: During recent years Kudzu has become a very popular crop for sub-marginal lands of the South. It is a legume. It provides excellent grazing for hogs during the summer months.

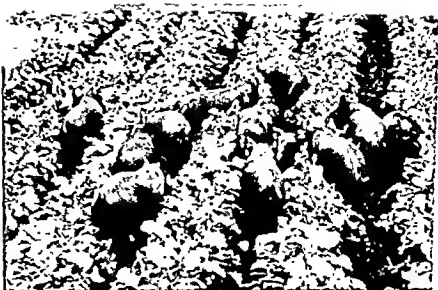
Crab Grass and Native Growth: Such plants as lespedeza, wild clovers, crab grass, Bermuda grass and various weeds that grow in the cultivated fields of the South make excellent green grazing for hogs. Such growth comes up in oat stubble. In fields where mature crops are hogged-off during the summer and early fall there is usually enough growth of this type to furnish excellent green grazing.

Green Grazing Crops—Fall Litters: Oats as a green grazing crop for hogs was previously discussed for spring litters. If oats are planted in early fall they will furnish green grazing on good land by November 15, and will provide an abundance of green grazing for fall farrowed pigs.

In the Coastal Plain area of the South oats will generally furnish more green grazing than will rye. In the Piedmont and mountain areas of the South rye and wheat give excellent grazing. In these areas oats often freeze during the winter.

Rape: Rape is a quick growing succulent plant that furnishes excellent forage for hogs. It is not a legume but ranks

Fig. 9-13. Pigs Grazing on Rape. Rape is a quick-growing succulent plant that furnishes excellent forage for hogs. It has a good carrying capacity. (Courtesy, USDA)

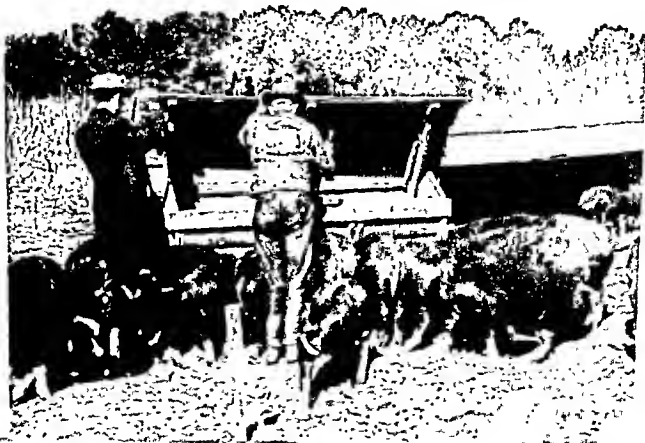


with the legumes as a source of protein to balance the grains that are fed. It is a heavy yielder and has a good carrying capacity. Rape must be planted on good land if desirable results are to be obtained. When properly rotated, rape can be grazed off two or three times during the winter and spring.

2. MATURE CROPS FOR HOGGING-OFF

It is common practice in the South to turn pigs into fields to harvest crops. This is known as "hogging-off" crops. A large per cent of the feed grown for swine in the Coastal Plain area of the

Fig. 9-14. These hogs are hogging-off soybeans and corn. The farmer and agriculture teacher are checking the feeders built in the school shop. (Photo by J. K. Coggin)



South is hogged-off. It has been found that under favorable conditions, such as sandy soils and a mild climate, hogging-off crops is much more profitable than harvesting the crops and feeding them in dry lots. This system eliminates much labor and reduces other expenses connected with harvesting.

The system has proved to be a good soil building practice. It also provides for adequate range. The major handicap to this system of feeding is the necessity for fencing off different fields and crops.



Fig. 9-15. Hogging-Off Peanuts. Excellent results are obtained when peanuts are hogged-off, provided they are supplemented with tankage or fish meal. (Courtesy, USDA)

Mature Crops for Hogging-Off—Spring Litters: The Georgia Coastal Plain Experiment Station has tested different crops in an effort to discover a continuous or year-round hogging-off program for swine. At this station sows are bred to farrow two litters per year, usually March and September. The spring litters are weaned in May and placed in the field to hog-off the crops. It is necessary to have a succession of crops in order that the pigs may reach grade number one in six to seven months.

Mature Crops for Hogging-Off—Fall Litters: By fall litters is meant those that are farrowed in early fall that should be

finished for market the following late spring. There are several crops grown in the South that are suitable for hogging-off during the winter and early spring. Experiments have shown that corn and runner peanuts for the first half of this period are unexcelled in sections where they can be grown and hogged-off.

Mature oats and sweet potatoes are good feeds for the latter part of the fattening period provided they are supplemented with corn, proteins, and minerals.

The hog farmer should develop the place for hogging-off crops best suited for his situation. It would be well to check these plans with the Hog Specialist at the State Agricultural College or with the vo-ag teacher.

In sections where hogging-off crops is not practical, the concentrates should be supplied along with permanent pastures of grasses and clovers, and temporary grazing crops adapted to the area where the farm is located.

III. METHODS TO USE IN FEEDING HOGS

In deciding on the method to use in feeding hogs the following problems should be considered: (1) whether to drylot feed or hog-off crops; (2) whether to feed shelled corn, ground corn, or ear corn; (3) whether to practice self-feeding or hand-feeding; (4) whether to feed cooked or uncooked feed; (5) whether to practice dry feeding or slop-feeding.

Some of the advantages and disadvantages of the different methods of feeding are discussed below. From the discussion an individual may determine the method that is best adapted to his farm.

Hogging-Off versus Dry-Lot Feeding: There are two systems that are used by southern farmers in feeding hogs. On some farms the feed is harvested and fed in dry lots or on permanent pastures. On other farms the feed is consumed in the fields by the hogs. This is called "hogging-off" feed. With this system additional concentrates are fed by hand or in self-feeders in order that the hogs may get a balanced ration. This is necessary when a balanced feed cannot be provided in the field.

The system of harvesting the feed is generally practiced on farms where soils are of a heavy type that tend to pack when

FEEDING HOGS ON CONCRETE

W. L. TURNER and CHARLES W. WILLIAMS

Considerable interest has developed in producing hogs on concrete. This is also known as "pig parlor" production, or dry lot feeding, or hog feeding pens.

Feeding pens differ from the conventional methods of hog production. The unit of production is often a pen with the necessary equipment for feeding-out 100 pigs to a market weight of 200 lbs. The feeding pens are used in a manner similar to broiler houses. Three or four batches of 100 ten to twelve week old pigs are fed-out per year. The feeding period is usually around 90 days per batch.

Cost of Materials

The cost of materials, with labor, poles and lumber furnished by the farmer, for a hog feeding pen 30' x 60' (100 hog capacity), with a shed roof covering one-half the concrete floor, amounts to about \$700. This cost is based on hog feeding pen Plan No. 512, printed by Extension Agricultural Engineers, North Carolina State College, and on prices for materials in the Raleigh area.

Materials cost: 30' x 60' hog feeding pen

(Poles and Lumber Furnished by Farmer)

Item	Cost
Sand, Cement and Stone	\$357.00
Treating Poles	36.50
Treating Lumber	62.00
Aluminum Roofing	188.50
Hardware and Nails	41.00
Cost of Materials	\$685.00
Sales tax on Concrete Materials, Roofing and Hardware	17.60
TOTAL CASH COST	\$702.60

If poles and lumber are purchased also, the cash outlay, including sales tax, will be increased to approximately \$930.00. If "concrete mixed in transit" is used, cash outlay will be increased another \$40 to \$50 plus cost of transportation.

Water Supply

Water under pressure is essential for cleaning hog feeding pens. The cost of getting water to feeding pens will vary greatly from farm to farm. In some cases it may be cheaper and more satisfactory to establish a well with an electric pump near the feeding pen. This is particularly true in areas where a pipe can be driven to water depth and a shallow well pump used.

Cost of Equipment

Two 12-hole feeders are necessary for 100 hogs. Two feeders cost between \$150 and \$200.

Six water fountains that operate on water under pressure are required per 100 hogs. These six fountains cost about \$36.00.

Receipts and Expenses

The following data show estimated receipts and operating expenses for 100 hogs on concrete:

Receipts -----	\$3,400.00
100 hogs — 17c per lb.	
Operating Expenses -----	
100 pigs -----	1,000.00
1,100 bu. corn -----	1,375.00
8,500 lbs. supplement -----	425.00
200 lbs. minerals -----	10.00
Vaccination for cholera -----	75.00
Worm treatment, etc. -----	35.00
Electricity -----	8.00
Estimated Expenses -----	\$2,928.00
RETURNS OVER EXPENSES -----	472.00

In this budget, corn is priced at \$1.25. With each 5c decrease in the price of corn, returns over expenses for 100 hogs should increase approximately \$55.00.

Fifty pound pigs at 10 weeks of age should be produced for \$5.00 or less per head. If a farmer produces his own pigs he should net an additional \$400 on a unit of 100 hogs.

If the farmer produces his own corn, he should net an additional \$550. This is based on corn being produced for a cash cost of 75c per bushel. Some farmers may find it more profitable to buy corn and to feed a larger number of hogs.

The farmer who produces his own pigs and corn should net approximately \$1,420 per 100 hogs fed. Three batches of 100 hogs should return \$4,295 to the land, labor, capital, and management. Any cash labor should be deducted from this return.

Other Considerations

(1) The initial cash outlay is high. The per hog investment for buildings and equipment is less when several hundred market hogs are produced annually.

(2) Feed conversion is slightly better on concrete and feed wastage is reduced.

(3) Good feeding and management are necessary to adequately control diseases and parasites. A balanced ration is absolutely necessary for fast growth.

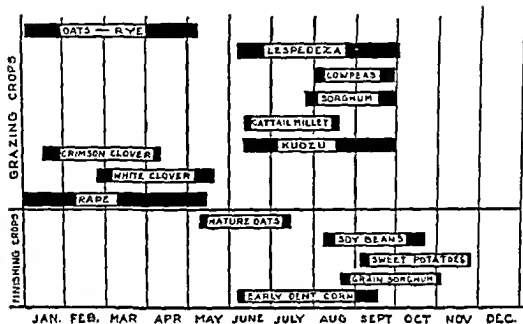
(4) A supply of good quality, disease-free pigs of uniform size is hard to find. It is often necessary to produce your own pigs.

(5) Sanitation is a daily must.

(6) Proper drainage and shade are essential.

(7) Manure must be removed.

Grazing and Hogging-off Crops for North Georgia



Grazing and Hogging-off Crops for South Georgia

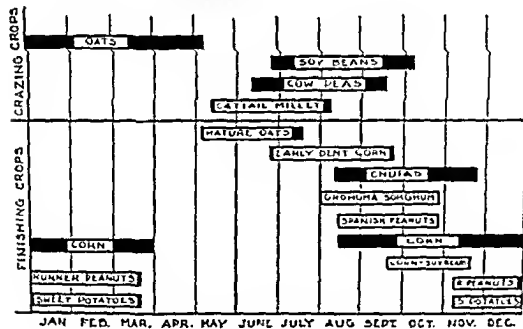


Fig. 9-17. Crops from which a year-round grazing system can be developed in one Southern state. (Georgia Extension Bulletin 535)



Fig. 9-18. Feeding-out hogs in dry lot is practiced successfully by some growers. Here is a good, clean situation. (Photo by J. K. Coggin)

animals run on them during rainy weather. This system is also used in sections where it is not practical to have grazing and feed crops throughout a large portion of the year. In sections of the South it is almost a universal practice to harvest the feed before it is fed to hogs.

Experiments show that hogs gain more economically if allowed to run in the fields and harvest the crops themselves. Probably the greatest advantage to this system is the reduction in feed cost for each 100 pounds of gain. This method also requires less labor and less storage space for feed which permits

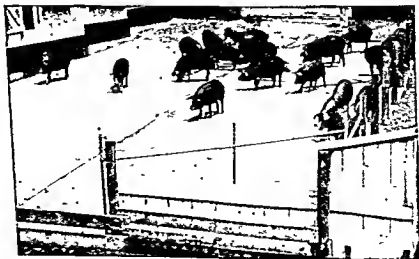


Fig. 9-19. Concrete Feeding Lot. Such a feed lot is easier to keep clean than a dirt lot but has some disadvantages. (Courtesy, Portland Cement Association)

the production of hogs on a much larger scale than is often possible if dry-lot feeding is practiced. This system also provides for profitable utilization of green grasses and other natural vegetation.

The Piedmont and other sections of the South where heavy soil types predominate and where it is cold in winter, are not so well adapted to hogging-off crops on a very large scale. But even in these sections temporary grazing can be used to advantage.

Grinding, Shelling, and Chopping Feeds for Swine: Tests at the Indiana Experiment Station showed that three lots of pigs fed ear corn, shelled corn, and ground corn, respectively, made almost identically the same daily gain. The hogs in each lot also consumed the same amount of corn. Results of this experiment indicate that there is no advantage in feeding shelled or ground corn.

Ground oats give better results than whole oats. It is usually preferable to grind other small grain for feeding to hogs.

Legume hay and other forms of dry roughage should be ground or chopped before feeding.

Self-Feeding versus Hand-Feeding of Swine: Numerous experiments have been conducted to determine whether it is best to practice self-feeding or hand-feeding of swine.

These records show that there is very little difference in the daily gain of pigs when self-fed and when fed by hand, provided they are hand-fed at least three times per day. There is considerable difference when hand-feeding is done only twice daily. The results also show that the cost of feed per 100 pounds gain is less when self-feeding is practiced. There is also a saving in labor when pigs are self-fed.

Other experiments show that self-feeding gives a higher average daily gain at a lower cost than hand-feeding. The advantages of self-feeding over hand-feeding are not as pronounced when hogs are on a permanent or temporary pasture as it is when they are fed on a dry lot. The tendency of sows and pigs to crowd out the feeders is not as serious in the case of self-feeding as in hand-feeding. Self-feeding also prevents over-eating at certain times and provides for a more thorough mastication and digestion of feeds.

Cooked Feeds versus Raw Feeds: Some years ago it was considered good practice to cook feeds before feeding them to swine. Recent experiments show that cooking the common hog feeds is detrimental rather than beneficial.

Soaking certain dry hard feeds such as flinty corn and dry velvet beans is sometimes necessary. Most feeds, however, should not be cooked or soaked for best results.

Dry-Feeding versus Slop-Feeding: It was formerly a common practice to grind the different grains and feed them to swine in the form of slop. Recent experiments have shown that dry-feeding under most conditions is preferable to slop-feeding. Ground feed is sometimes wasted when exposed to wind unless it is dampened.

Water: An abundant supply of clean water is needed by hogs at all times. Provisions for keeping the water cool in summer is important.



Fig. 9-20. Plenty of clean water is essential in any feeding program. The system shown here is economical and easy to use. (Photo by J. K. Coggin)

IV. FASTEST OR CHEAPEST GAINS FOR HOGS?

Are the fastest gains always the most profitable? For many years it was thought that fastest gains were the cheapest gains. The theory was that with a shorter feeding period less feed would be needed for body maintenance. Therefore, more of the feed would go into body-weight gains with the result that the feed cost per pound of gain would be kept at a minimum. *This may not always be the case.* In fact, the fastest gains may not be the most profitable.

Least-Cost and Least-Time Rations: Recent research at Iowa State College has been done around the idea of "Least-Cost Ration" and "Least-Time Ration." This is not a matter of withholding feed or reducing the amount or quality of feed for hogs. It is clear that a balanced ration is needed for all hogs at all times. The key to this matter is the *level of protein*. The higher level means more rapid rate of gain up to a certain point. The problem then becomes one of substituting a less expensive source of protein and reducing the level of protein as the hogs get older. Both of these matters are shown in detail as found at Iowa State College in Tables 15 and 16.

Cost and Return: The process of using the principle of "Least-Cost Ration" is not simple. It is necessary to figure the relative price of substitutions; that is, in the table whether more soybean oil meal is used to replace corn may be partly determined by the current price of each product. Furthermore, it is necessary to keep a close check on the market situation—and a good prediction would help!

Self-Feeding or Hand-Feeding: The decision as to hand-feeding or self-feeding is particularly important in trying to use the Least-Cost Ration. The feeding trials at Iowa State College show that hand-feeding is preferred to free-choice feeding by the hogs. This permits keeping the protein at the desired level. In another way it is saying that the man doing the mixing of the feed knows more than the hog about what the hog needs to eat. This does not mean that self-feeders cannot be used, but that the total ration should be mixed rather than giving the hogs free choice of grain and protein supplement.

Rule-of-Thumb for Protein Level: For a guide in changing the protein level of feed, Iowa State College gives the following rule-of-thumb:

Table 15. Feed Combinations to Produce 100 Pounds of Gain for
Three Weights of Hogs.

Weaning to 75 pounds			75 to 150 pounds			150 pounds to market weight		
SBOM* Lbs.	Corn Lbs.	Per cent Protein	SBOM Lbs.	Corn Lbs.	Per cent Protein	SBOM Lbs.	Corn Lbs.	Per cent Protein
20	287	10.0	20	319	10.4	20	359	10.2
30	229	12.4	30	296	11.6	30	342	11.2
40	195	14.4	40	281	12.7	40	333	12.1
50	172	10.3	50	269	13.9	50	325	13.0
60	155	18.2	60	260	15.0	60	319	13.9
70	143	20.0	70	253	10.0	70	314	14.8
80	132	21.7	80	247	17.1	80	309	15.6

From Iowa State College

*Soybean Oil Meal. It should be understood that Corn and Soybean Oil Meal do not make a complete ration. Vitamins, minerals, and antibiotics must be in the ration.

Fig. 9-21.

Table 16. Total Days to Attain Specified Gains.

<i>Per Cent Protein in Ration</i>	<i>Weaning in Market Weight</i>	<i>Weaning to 75 pounds</i>	<i>75 pounds to 150 pounds</i>	<i>150 pounds to market weight</i>
	<i>(days)</i>	<i>(days)</i>	<i>(days)</i>	<i>(days)</i>
10	151	51	53	46
12	120	38	44	38
14	111	33	42	36
16	108	30	42	36
18	112	28	44	40
20	122	28	48	46

From Iowa State College

Fig. 9-22.

14 per cent protein from weaning to 75 pounds

12 per cent protein from 75 to 150 pounds

10 per cent protein from 150 pounds to market

It should be remembered that this is only a guide. To get greatest profits a hog farmer must fit his feeding plan to his own farm situation and plan to mix his feed to best meet the prevailing prices.

SUMMARY

Feed is the major item of expense in producing pork in the South. In fact, almost two-thirds of the total cost is in the "fattening period" from weaning to killing or market.

A clear understanding of the value and limitations of corn in feeding hogs is necessary if an effective job is done. No hog farmer who wants to stay in business will feed hogs corn alone. Yet, many farmers make little or no effort to balance rations for the most economical gains.

The feeding value as well as price must be considered when substituting other grains for corn in the hog ration.

Concentrates are more important than roughage in feeding hogs as compared with feeding cattle. However, grazing crops and other roughages have an important place in feeding hogs. The alert hog farmer in the South can provide green grazing the year-round. Not only does this provide a valuable part of the ration, but studies have indicated that hogs make better use of some other feeds if they are on good pasture. Still another reason is that plenty of good grazing helps control diseases and parasites.

Feeding garbage or other waste materials should be done only after careful check of regulations. A balanced ration should be fed at all times.

The mineral mixture best adapted to local needs should be provided. The State Agricultural College can furnish information as to mineral mixtures that should be used.

A lot of "fancy fixing" of feeds, such as cooking, soaking, grinding, is not necessary. The big need is a balanced ration in proper quantities.

One recent development in feeding hogs indicates that the fastest gain may not be the most profitable. A careful study of all factors involved may cause the hog farmer to feed a "Least-Cost Ration" rather than "Fastest-Gain Ration."

PROBLEMS AND ACTIVITIES

1. What decisions must a farmer make in planning a feeding program for hogs?
2. List the things that should be considered in making each decision.
3. What feeding ration is now used for the hogs on your farm?
4. What are the advantages and limitations in hogging-off crops?
5. What crops should be hogged-off on farms of your community?
6. What crops could be used for grazing on the farms of your community?
7. *What is the value of self-feeding?*
8. What is the value of cooking, grinding, chopping, and soaking different feeds?
9. Visit two or more farms where hogs are fed out for market. Compare the feeding practices on these farms.
10. Make a chart for green grazing for hogs on the farm each month of the year.

CHAPTER 10

Marketing Hogs

Every farmer looks forward with much interest to the time when he can market his hogs and receive returns for his labor. There are some who think of marketing as something separate and distinct from production—but it is not. Many of the more important problems of marketing hogs are solved as a definite part of the production program. Hogs that are marketed at a profit must be produced economically and fed out so they will be ready for market at the right time. A farmer cannot hope to market at a profit, hogs that have not been produced on a sound economical basis. Nor is it possible to obtain the top price for hogs that are not finished properly. So the ability to market hogs at a profit depends in a large measure on the type of hog and the kind of production program that has been followed.

There are certain problems connected with marketing hogs with which every hog farmer is confronted. They may be listed as follows: (1) when to market hogs; (2) size of hogs to market; (3) method of marketing to use, and (4) avoiding market losses. The purpose of this chapter is to set forth certain information that can be used as a basis for making these decisions.

WHEN TO MARKET HOGS

The marketing date for finished hogs is definitely affected by the breeding and feeding program on the farm. A good procedure to follow is to determine the best months, from the standpoint of price, to market hogs and then adjust the breeding and feeding schedule to fit in as near as possible with those dates.

In some sections and on many farms it may not be practical to arrange a feeding program that will make it possible to finish hogs at the time prices on an average are highest. It should, however, be the goal of every farmer to have his hogs ready for market at a time other than when prices on an average are lowest.

The most important factors affecting the time to market hogs are: (1) the supply of hogs marketed during each month,



Fig. 10-1. Future Farmers deciding whether group of hogs is ready to market. (Photo, courtesy of Texas FFA)

(2) the average price of hogs for each month, and (3) feed available for growing out hogs to reach market during months when prices are highest. Each of these factors should be given careful consideration in deciding when to market hogs.

When hogs at a given time are thrown on the market in great numbers, it tends to push the price down. This is true of any perishable or semi-perishable product. In the South a large percent of the hogs are marketed in a reasonably short period of time. This forces the packing plants to maintain larger storage facilities and causes inefficient use of labor. This results in lower prices for hogs during the periods when hogs are "dumped" on the market—and the farmer is the loser.

Supply of Hogs Marketed Each Month: The South's supply of hogs is concentrated on the markets during the months from December to March. Very few are sold from May to October. The flow of hogs to the Chicago market is more uniform throughout the year.

It is also interesting to note that in the South heavier hogs are marketed in the winter months than are sold during the summer.

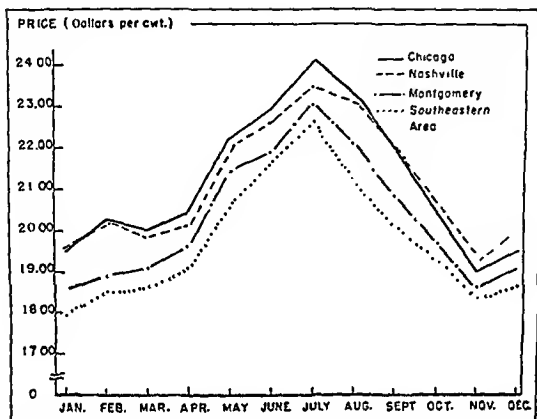


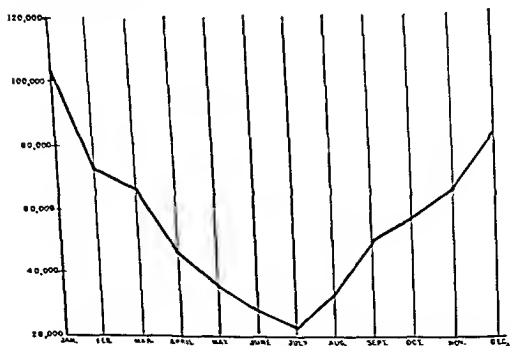
Fig. 10-2. Seasonal variation in the prices of 180- to 240-pound hogs at selected terminal markets for a 3-year period. The Southeastern area includes quotations from Albany, Moultrie, Tifton, and Thomasville, Georgia; Dothan, Alabama; and Jacksonville, Florida. (Courtesy, Alabama Experiment Station)

Normally the greatest number and the heaviest hogs are placed on the southern market during the winter months. A smaller percentage of the hogs are marketed from April to October. These conditions provide for a very unequal monthly supply of hogs on southern markets throughout the year.

The difference in the monthly supply of hogs on the southern market and the Chicago market, is due largely to the fact that the feeding programs in the two regions from which the hogs come are not the same. The hogs that supply the Chicago market are grown on corn that is harvested and stored for feeding throughout the year. The majority of those that supply the southern markets are grown mostly on crops that are hogged-off during the fall and winter and are marketed as soon as the feed gives out. In certain areas of the South the corn is harvested and fed in a similar manner to that used in feeding hogs that are sold on the Chicago market. In these areas hogs are marketed more uniformly throughout the year.



Monthly average prices of hogs at eight Southeastern packing plants for a 5-year period.



Monthly average hog receipts at eight Southeastern packing plants for a 5-year period.

Fig. 10-3. Monthly average price and hogs received at eight Southeastern packing plants. (Courtesy, Georgia Extension Service)

The Average Price of Hogs for Each Month: The supply of hogs on a market influences the price per pound that hogs will bring. Usually when the supply is lowest, the prices are highest; and when the supply is highest, the prices are lowest. This is well illustrated by the graph in Fig. 10-3. Note that as the per cent of hogs marketed comes down, the price goes up. On markets where there is a more uniform supply of hogs throughout the year, there is less fluctuation of the average monthly price. A grower should study his market and if possible finish hogs so that they can be sold at a season when few hogs are being marketed. The price at such a season is almost sure to be higher than at a time when the market is "glutted."

Feed Available for Growing Out Hogs: It is important that a system of breeding and feeding swine be developed that will provide for a more uniform monthly supply of hogs to be placed on the southern markets. This will prevent the over-flow during certain periods of the year which results in much lower prices while the markets are congested.

If the breeding and feeding practices, suggested in this book, are put into practice on the farms of the South, it will doubtless result in a more uniform supply of hogs on the markets, and will also result in a higher income from the swine industry as a whole.

SIZE OF HOGS TO MARKET

There is a definite relationship between the weight at which hogs are marketed and the returns from the enterprise. The weight of hogs when marketed affects both the price per pound and the total value per hog.

Some markets combine some of these, for example, 180-240 is used as "tops" in some areas. The seller would do well to know in advance of these groupings; it might make a difference in his time of marketing.

The weight of a hog together with its grade determines the carcass and the percentage of lean meat cuts. Therefore, the weight groups are narrow compared with other animals. Weight groups differ on markets but are generally as follows: 120-140 pounds; 160-180 pounds; 180-200 pounds; 200-220 pounds; 220-240 pounds; 240-270 pounds; 270-300 pounds; 300-330 pounds; 330-360 pounds; 360-400 pounds; 400 pounds and up.

Table 17. Amounts by Which Prices Paid for Hogs Weighing 180 to 240 Pounds Were Greater Than Prices Paid for Hogs in Other Weight Groups, Selected Local Markets in Three Sections of Alabama.

Location of Market	Weight Group			
	140-150 lbs.	160-179 lbs.	241-299 lbs.	300 and over lbs.
	<i>dollars per hundred lbs.</i>			
Northeast	2.69	1.30	1.32	3.82
Southeast	1.49	.60	1.31	3.45
South Central	2.07	.96	1.71	4.23

Ala. Exp. Sta.

Fig. 10-4.

Table 18. Percentages of Slaughter Hogs Sold at Selected Local Markets, by Specified Weight Groups, for a 3-Year Period.

Location of Market	Weight Group					Total
	140 to 159 lb.	160 to 179 lb.	180 to 240 lb.	241 to 299 lb. ¹	300 lb. and over ²	
	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
Northeast	5	10	68	9	8	100
Southeast	14	18	59	5	4	100
South Central	15	19	55	7	4	100

¹Heavies.²Extra heavies.

—Alabama Exp. Station

Fig. 10-5.

Relation of Weight to Income: A number one hog brings the highest price per pound, and the less the weight of the hog the lower the price per pound. The income per hog therefore, decreases as the weight decreases due both to lower price per pound and less weight per hog. A "heavy" sells for less per pound, but brings more per hog due to its excess weight. However, the feed consumption is relatively greater for heavy hogs and the net returns are lower than for hogs that are sold when weighing around 200 pounds.

Relation of Weight to Feed Consumed: There is also a definite relationship between weight of hogs and feed consumed per 100 pounds gain. Results of experiments show that the larger the hog the larger the quantity of feed consumed per pound of gain. Based on this factor alone one would conclude that it is best to market hogs at a low weight. It can also be seen in Table

19 that the decision of putting on additional weight before selling depends on several factors. Both loss in price per pound and increased cost of feed per pound results when hogs above 240 pounds are marketed.

Authorities agree and it has been borne out by tests that it is most profitable to market hogs ranging in weight from 180 to 237 pounds. Hogs can be made to reach this weight in six months from the time they are farrowed—if properly bred, fed, and protected from parasites and diseases.

Table 19. Estimated Costs of Putting 30 Pounds of Gain on Hogs Weighing 170, 200, and 230 Pounds, at Several Assumed Prices for Corn

Price of corn per bushel	Total cost of gain ¹					
	170 lb. fed to 200 lb.		200 lb. fed to 230 lb.		230 lb. fed to 260 lb.	
	Cost of 30 lb.	Cost per 100 lb.	Cost of 30 lb.	Cost per 100 lb.	Cost of 30 lb.	Cost per 100 lb.
Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
1.25	3.91	13.03	4.06	13.53	4.22	14.07
1.50	4.69	15.63	4.88	16.27	5.06	16.87
1.60	6.00	16.67	5.20	17.33	5.40	18.00
1.70	5.31	17.70	5.52	18.40	5.74	19.13
1.80	5.62	18.73	5.85	19.50	6.08	20.27
1.90	5.94	19.80	6.18	20.60	6.41	21.37
2.00	6.25	20.83	6.50	21.67	6.75	22.60

¹Calculated on basis that 2.5 bushels of corn or its equivalent are required to put 300 pounds of gain on a 170-pound hog, 2.6 bushels on a 200-pound hog, and 2.7 bushels on a 230-pound hog. To the cost of feed, 25 per cent is added as approximate costs other than feed. —Ala. Exp. Sta.

Fig. 10-6.

METHOD OF MARKETING TO USE

For many years two methods of marketing hogs have been practiced by farmers of the United States: (1) public stockyard marketing, and (2) direct marketing.

Public Stockyard Marketing: In public stockyard marketing the services of livestock commission agents are utilized by the sellers and the privileges of trading in livestock is equally available to all who wish to buy or sell. Public markets receive and sell all hogs offered at some price. Hogs may be delivered at practically all hours, but the trading hours at such markets are usually between 8 A. M. and 3 P. M.



Fig. 10-7. These champion barrows are ready for market. (Photo, courtesy of Texas FFA)

When hogs are received at public markets it is the practice of the consignee to put them in shape for sale by allowing them time to rest, giving them access to feed and water, and sorting them into market groups that will be attractive to buyers. The hogs are then sold and the proceeds, after deducting various marketing and transportation charges, are remitted to the shippers. This system of marketing has been practiced more by

farmers of the corn belt than by southern farmers. One advantage of this method is that hogs may be held for several days before being rushed to the packer, thus enabling farmers to sell hogs at a fair price at any time throughout the year.

Direct Method of Marketing: In direct marketing the hogs are sold at places other than recognized public stockyard markets. Direct sales may be made to the slaughterer or his agent in the localities where the livestock is produced, at some point not recognized as a public market, or sales may be made on delivery to the slaughtering place. The term direct marketing also applies to the movement of feeders and breeding stock, other than those made at public stockyards. This system of marketing is used almost exclusively by farmers of the South.

Market Agencies in Direct Marketing: The following agencies operate to promote the system of direct marketing: Packing plants, local dealers, local meat markets, cooperative hog sales, and auction sales.

Packing Plants: Packing plants slaughter a large part of the hogs that enter into trade. They are usually owned by large packing corporations that have other plants located in the great livestock marketing centers of the country. These local plants are important links in the distribution of livestock products to the consumers of this country. They provide a direct market for livestock for a large part of the South. Their supply of livestock arrives by rail, truck, and farm wagons.

Packing plants buy all classes and grades of hogs. The farmer knows in advance the prices to be received for certain grades. The inferior grades are priced lower. No effort is made to hold the hogs for the farmer. The transaction is made upon delivery of the hogs.

Local Dealers: Local dealers continue to hold a strong position in the marketing of livestock in the United States and have become an important factor in the development of direct marketing during recent years. Some local dealers operate at established places where livestock is delivered by farmers in the community, but a more recent and growing practice is for the local dealer also to buy livestock at the farms in his trading area, and, utilizing his own trucks, transport the animals to his own assembly point or to the market outlet of his choice.

Although no exact information is available as to the proportion of the hogs which were received at public markets from

local dealers prior to the rapid development of direct marketing, it is generally known that the percentage was rather high. It is apparent, therefore, that farmers continue to sell hogs in large numbers to local dealers. The local dealer, on the other hand, has shifted his outlet in a large measure from public markets to sales direct to packers, to concentration yards and, to some extent, to auctions.

Local Meat Markets: Livestock abattoirs, located in many of the smaller cities, furnish slaughtering and marketing facilities to farmers of the surrounding section. They facilitate the movement of livestock products into the local channels of consumption. The operators of these abattoirs also purchase livestock on their own for slaughtering and serve in a smaller way to furnish the same services as the larger packing plants.

Cooperative Hog Sales: In the South many hogs are sold through cooperative sales. These cooperative sales seem to be on the increase. They are especially serviceable to small producers.



Fig. 10-8. Auctions are fun for everybody—except the owner if prices are low. This Louisiana Future Farmer looks surprised—at the high price maybe! (Photo, courtesy of Louisiana FFA)

The assembly of the hogs from the many farms where produced, and their transportation to the packing plants were accomplished until recently almost entirely by the individual producer and the local livestock buyer. This part of the marketing system has been greatly improved by the inauguration of the cooperative hog sales. The sales provide a grading service and close contact with the general hog market which tend to keep local prices in a more equitable relationship to central market prices. They enable buyers from packing plants to buy hogs in truck and carload lots for shipment to their plants.

Auction Sales: In recent years many livestock auction sales have been inaugurated. They are usually conducted by individuals or associations who furnish the facilities and make available about the same services as those provided by the cooperative sale.

The farmer should choose the market that will give the greatest returns with all other factors taken into consideration.

MARKET CLASSES AND GRADES OF HOGS

On many of the Southern markets hogs are not sold according to the same classes and grades that are used on the great central markets of the Middlewest. In general, hogs are graded on many southern markets largely on a basis of weight only. As hogs improve in quality in the South, sentiment grows in favor of grading hogs in keeping with their finish.

Classification Set Up by Various Interests: In 1931 various interests, composed of farmers, meat processors, and representatives of the United States Department of Agriculture, met and set up classes and grades of market hogs. There have been changes in these. Although still on a voluntary basis, more and more hog markets in the South are buying hogs by official grades.

Market class is based upon the sex of the hog. They are barrow, gilt, sow, boar, stag and pigs. For slaughter hogs, barrows and gilt are classed together.

Market grade indicates quality, finish, and conformation. Grade should not be confused with inspection. The purple ribbon-like stamp with the grade name and letters USDA in a shield denotes grade and quality. The other inspection stamp has nothing to do with grade but usually refers to sanitation.

The new grades for market hogs are based largely on quantity and quality of lean meat. Weight, the degree of finish, and

percentage of fat are other factors. It should be known that these grades apply to hogs on foot as well as after they are slaughtered. There are still a number of markets in the South where these grades are not used in buying hogs. The five grades for market hogs are as follows:

- U. S. No. 1
- U. S. No. 2
- U. S. No. 3
- Medium
- Cull

U. S. No. 1. Hogs in this grade must produce the highest quality cuts of pork. The carcass has at least 50 per cent of weight in primal cuts (hams, loin, picnics, and Boston butts). There is a high ration of lean to fat. The carcass of a 200-pound hog in this class will measure approximately 30 inches, and will have from 1.4 to 1.7 inches of backfat.

U. S. No. 2. Hogs in this grade will produce a high quality pork, but there will be a little more fat than in the U. S. No. 1. The carcass will yield from 45 to 48 per cent of its weight in the primal cuts. The carcass length will be about the same as the U. S. No. 1 but the backfat will be from 1.7 to 2.0 inches.

U. S. No. 3. Hogs in this grade have a high quality pork but are overfat. The carcass will yield less than 45 per cent of its weight in the primal cuts. The carcass length will be less than 30 inches and backfat on a 200-pound hog will be 2.0 inches or more.

Medium. Hogs in this grade are underfinished. The cuts of pork are soft and flabby. These hogs may have a high percentage of lean to fat, but there is little or no marbling.¹ The backfat is not excessive, due to poor finish, 1.1 to 1.4 inches on a 200-pound hog.

Cull. Hogs in this grade are decidedly underfinished. The ratio of lean to fat will likely be high, but the pork will be soft and watery, with no marbling. The backfat may average less than 1.0 inch.

A slightly different approach to use as a guide to the hog farmer interested in market grades is shown in Table 20 giving

¹Marbling is the lace-like network of fat visible in the cut surface of meat. It is one of the best assurances of quality. Animals producing well-marbled carcasses must carry some fat and be gaining in weight.

weight and measurement of carcass length as it relates to back-fat thickness in the different grades.

Hogs are frequently classified according to use. Market reports generally use these terms. The more common terms are: Slaughter Hogs, Feeder and Stocker Hogs, Feeder Pigs, and Slaughter Pigs. The seller should be sure that he understands exactly the terms used by the buyers at the market. This should be known well in advance of the time of marketing his hogs, so that the seller will be able to estimate the number of hogs likely to be classified into the different groups.

MARKET LOSSES

Some farmers take a loss at the market because of their own carelessness in handling the hogs. These losses have become so great that there is a national organization, Livestock Conservation, Inc., devoting much effort to helping hog growers realize the importance of this matter. Losses from bruises on hogs have been estimated at over 5 million dollars a year, or more than \$1 per hog.

Here are the causes of the bruises that result in damage and loss to the pork in the proportion indicated.

Canes, whips, clubs.....	42%
Kicking, prodding	20%
Crowding, trampling	15%
Fork, nail punctures	12%
Other causes	11%

The Hog Specialist at North Carolina State College offers the following specific suggestions to prevent these useless losses nt market:

1. Feed minerals for strength of bones. Weak bones in fat hogs nccount for many cripples.
2. Do not confine hogs to floored pen. Hogs kept on floors cripple easily. If feeding floors nre used permit the hogs to range on pasture when they wish.
3. Provide comfortable shelter, nvoiding drafts nnd other conditions which cause hogs to pile up.
4. Provide convenient hog sorting nnd loading facilities on the farm.
5. Mnke frequent inspection of pens, yards, fences nnd

Table 20. Weight and Measurement Guide to Grades of Hogs.
(Barrows and Gilt)

Carcass Weight	Carcass Length	Average Backfat Thickness in Inches			
		U.S. No. 1	U.S. No. 2	U.S. No. 3	Cull
Under 120 lbs.	Under 27 in.	1.2-1.5	1.5-1.8	1.8 or more	0.9-1.2 Less than 0.9
120-164 lbs.	27-29.9 in.	1.3-1.6	1.6-1.9	1.9 or more	1.0-1.3 Less than 1.0
165-209 lbs.	30-32.9 in.	1.4-1.7	1.7-2.0	2.0 or more	1.1-1.4 Less than 1.1
210 lbs. or more	33 or more in.	1.5-1.8	1.8-2.1	2.1 or more	1.2-1.5 Less than 1.2

Either carcass weight or length may be used. The figures given are for normal weight and lengths. In cases where these do not agree, use the one thought most applicable. The carcass weight is based on a chilled, packer style carcass. The length of carcass is from the forward point of the alch bone to the forward edge of the first rib. The backfat thickness is the average measurement made opposite the first and last ribs and the lumbar vertebra. (From *The Marketing of Livestock and Meat*, Interstate Printing Company.)

Fig. 10-9.

Fig. 10-10. Agriculture teacher is showing some Future Farmers how to help a hog move in desired direction without running, beating, or bruising. (Photo, courtesy of Florida FFA)



- houses for protruding nails, broken boards and loose wire. Remove or cover sharp corners.
6. Use wide gates to prevent crowding.
7. Do not strike or kick hogs. Use a canvas slapper. An unusual noise will help to drive hogs better than striking or kicking them.
8. Do not feed hogs for 12 hours before loading. This will reduce shrinkage.
9. Handle animals quietly, avoiding haste and excitement. Load through openings familiar to the animals.
10. Use a loading chute on the farm. Do not catch fat hogs by the legs. Let them travel under their own power. Do not overload.
11. Drive trucks carefully. Turn corners slowly, start and stop gently, and slow down on curves.
12. Bed truck with sand. Add straw in cold weather. Wet the sand in hot weather and furnish shade with canvas or brush.
13. Do not pour water on a hot hog. To do so may prove fatal. In hot weather move hogs at night or in cooler part of day, whenever possible.

SUMMARY

Marketing is very closely related to all other phases of the hog business. It is necessary to start with a good animal, feed and manage it well to have "top" hogs to market.

The best time to market depends upon the feed situation on the farm as well as prices at the market. The farmer who plans ahead will try to avoid the "low-price" months of November-December and March-April. The supply of hogs marketed are greatest in these months. Peak prices generally come in June-August and January. On the average, hog prices are best during the summer months.

Official market grades have been established. Although there are still many markets in the south where buying is not done by grade, the trend is in that direction. This will mean that quality hogs will bring higher prices. The alert hog farmer will start learning how to judge the grades and produce the highest quality hogs.

Many hog farmers in the South still put too much fat on hogs before marketing. This was encouraged in the "ton-litter days." Even at markets not buying by grade, the fat hog still does not bring top prices. The housewife is demanding lean meat—or buying some meat other than pork if she cannot get the lean cuts.

All available markets should be checked well in advance of marketing hogs. Cost of getting hogs to the market must be calculated along with the prices being paid for hogs.

Changes in the price of hogs in local markets are closely associated with changes at the larger markets in other sections of the country. The leading hog market is in Chicago. Price quotations from the Chicago market reflect the hog situation and may influence local prices. The alert hog farmer will make a habit of watching the hog market.

Feeding hogs to heavier weights when prices are rising and selling at lighter weights when prices are falling may increase profits.

Market losses due to bruises can be prevented by careful handling of hogs.

PROBLEMS AND ACTIVITIES

1. What things should be considered in deciding when to market hogs?
2. What is the effect of supply of pork on price?
3. Discuss the causes of the variation in monthly supply of hogs for the market.

4. What weight hogs consume the most feed per pound of gain?
5. What weight hogs are most profitable to market?
6. What is the best method to use in marketing pork?
7. What are the different kinds of markets for pork in the South?
8. Discuss the relationship of marketing hogs to breeding and feeding.
9. Visit a packing plant and observe the difference in income from different grades of hogs.
10. Work out the classification of hogs used by the packing plant.
11. Study classification of grades of hogs used by your local and state papers.
12. List the ways in which hogs may easily get bruised on the farm. How can these be remedied?

CHAPTER 11

Butchering Hogs on the Farm

Butchering hogs and preserving the meat on the farms of the South has long been practiced. In fact, more hogs are butchered on the farms of the South than in any other section of the nation. There are many farms, however, that are not providing an adequate quantity of meat for home use. Much of the meat that is provided is not of the best quality. Too much of it is not properly cured or is allowed to become too salty.

Great quantities of pork spoil each year on the farms of the South. Much of the spoilage and poor quality meat occurs as a direct result of improper practices in butchering hogs and curing pork. The main reasons why a great deal of pork spoils each year may be summed up as follows: (1) often hogs are not properly bled; (2) curing process is started before animal heat has left pork; (3) meat is not repacked during curing process; and (4) curing process is not continued long enough.

Many farmers have had splendid success in butchering and curing pork, but many others have not been satisfied with their results. By carefully employing proper methods of killing and curing, farmers can secure a more satisfactory product for home consumption and also develop a good market for surplus pork and its products.

Amount of Pork to Butcher for Home Use: Specialists in nutrition have found that a family of 5 persons (2 adults and 3 children) need from 400 to 500 pounds of pork and lard annually for home use. This means that from 500 to 700 pounds of live weight should be provided. The amount of pork recommended above assumes that a supply of poultry, beef, and fish will also be available. If pork products are to be marketed, a surplus in addition to that needed for home use should be properly cured for marketing. Many farms provide no pork at all for home use. Many other farms, where an attempt is made to grow hogs for home use, have an insufficient supply to meet the dietary needs of the family. Therefore, an effort should be made by more farmers in the South to provide a larger supply of pork for home consumption.



Fig. 11-1. Sticking the Hog. This picture shows the way the hog should be held while being stuck. (Courtesy, USDA)

Kind of Hogs to Butcher for Home Use: Hogs weighing from 180 to 240 pounds produce the best quality pork and cuts of the most usable size. Besides producing pork of low quality, large hogs weighing from 400-500 pounds are hard to handle and often are damaged in butchering. Large cuts are difficult to preserve and often spoil. Hogs weighing above 240 pounds require more feed per 100 pounds of gain than those up to 240 pounds. This means that hogs that are butchered when weighing around 200 pounds are not only of better quality when cured, but require less feed per pound of gain.

Hogs should be moderately fat when butchered to produce best quality cuts of meat. Large, fat hogs produce hams and shoulders with excess fat.

Only healthy hogs in a thrifty condition should be butchered. Hogs that are "off feed" should be held over until they have a good appetite.

When to Butcher Hogs for Home Use: The method of curing will largely determine the time to kill hogs for home use. If there is available either a commercial, community, or private refrigeration plant, pork may be killed at most any time of the year. However, if artificial refrigeration is not used, butchering should take place during the winter months. A clear cool period

when the temperature is below 40 degrees Fahrenheit should be selected. It is better to kill at the beginning of a cold snap than at the end. Even in case of artificial refrigeration, cool clear weather is a more desirable time for butchering.

What Preparation for Slaughter to Make: The hogs to be slaughtered should be penned the day before butchering. They will bleed more thoroughly and dress easier if not fed for 24 hours before sticking. Only water should be given to the hogs during this 24 hour fasting period. At the time of killing, the animals should not be unduly excited. Badly excited animals do not bleed out thoroughly, consequently, the meat is likely to be bloody. Such meat looks bad and spoils easily. Bruised and whip marks should be avoided for such bruised places on the carcass will have to be trimmed out and thrown away.

PROVIDING EQUIPMENT FOR BUTCHERING HOGS

The job of butchering hogs can be more efficiently done when good equipment is provided. Expensive and elaborate equipment is unnecessary. Some items of equipment which are desirable, and which will help do the job better and in less time are discussed below.

A curved 6-inch skinning knife is a handy tool. It can be used for sticking, shaving, or dressing the carcass and cutting the meat. As soon as the user becomes accustomed to its shape, it will be found to cut more smoothly and more easily than a straight butcher knife.

A narrow blade boning knife is handy in boning out meat for canning and for the preparation of boneless roasts. To keep the knives sharp, an oil or water stone and steel should be a part of the equipment. The steel is not a sharpening tool but is used to keep a sharp knife in good cutting condition.

A meat saw not less than 22 inches long is almost essential, although a good wood hand saw may serve the purpose.

Bell-shaped scrapers, gambrels or singletrees with open books, a hog hook, axe or cleaver, and dairy thermometer are other useful pieces of small equipment.

A 50-gallon hardwood barrel makes a satisfactory scalding vat for hogs up to about 250 pounds in weight. A metal tank 6 feet long, 2½ feet wide and 2 feet deep, set up on bricks or over a trench, also makes a good scalding vat, and the water can be kept hot indefinitely.

KILLING THE HOG

How to Kill and Stick the Hog: Knocking in the head or shooting is often a cruel procedure, and kills the hog too quickly thus stopping the flow of blood which results in improper bleeding. Sticking the live hog is approved by swine specialists. This may be done by following the procedure outlined below and illustrated by the drawing.

The opposite front leg of the hog is grasped and with a quick jerk the hog is rolled upon its back. Sticking should immediately follow. The hog is held on his back by standing astride his chest, holding the front legs. The man who is to do the sticking then grasps the lower jaw of the hog with his left hand, and with the knife in his right hand, opens the skin about three inches just in front of the point of the breast bone along the middle line of the neck.

The knife is then held at about a 45 degree angle directed toward the tail of the hog. Care should be taken to keep the knife in the center. The knife should be pushed under the breast bone. The knife is pushed in about one inch and the point is first di-

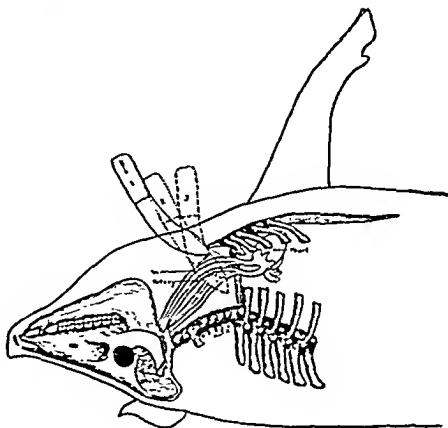


Fig. 11-2. Sticking the Hog. The knife positions 1, 2 and 3 show the forking and artery split under the point of the breast bone.

(Courtesy, USDA)



Fig. 11-3. Scalding the Carcass. The hog is being removed from the scalding barrel with the aid of a long hook. (Courtesy, USDA)

rected downward toward the backbone, and then forward toward the head, cutting the large blood vessels at the point where they leave the chest. The heart should not be stuck so that it will pump out the blood as long as possible.

SCALDING THE CARCASS

Probably the most important thing to consider in scalding is the temperature of the water. When a scalding barrel is used the temperature of the water in the barrel should be 150 degrees Fahrenheit. This temperature will insure a long soak which is helpful in cleaning the hog. Many persons suggest that either

soap or wood ashes be added to the water before scalding. This is helpful in cleaning the hog, but makes handling more difficult. It has been suggested by some that a pint of lime to each 30 gallons of water be added. This makes the hair easier to remove, but interferes with the cleaning of the hog since it makes the water hard. In most cases water alone is all that is necessary for proper scalding.

One end of the carcass should be inserted in the barrel and should be allowed to remain until the hair slips easily. Constant

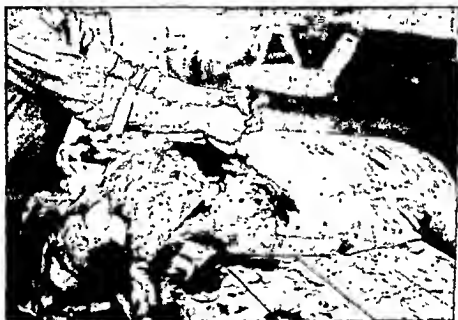


Fig. 11-4. Scraping Carcass. The hair is being removed by use of a bell-shaped scraper. A knife will serve the same purpose. (Courtesy, USDA)

moving around of the carcass and testing the removal of the hair should be made. As soon as the hair slips easily the carcass should be removed and the hair scraped off of the scalded end of the hog before the other end is inserted in the barrel. Repeat for the other end of the hog as described above.

If the legs and ears of the hog are not sufficiently scalded, a sack should be wrapped around them and water of about 150 degrees Fahrenheit poured on and allowed to remain until the hair is loosened. If the water is too hot or the carcass is allowed to remain in the water too long the hair will become "set." If this should happen, shaving the hair with a sharp knife is the only solution.

REMOVING THE INTERNAL ORGANS

Hanging the Carcass: The carcass should be hung up by means of a gambrel stick, the pointed ends of which are inserted beneath the tendons at the back of each hind leg between the feet and the hock. It should then be hung to a scaffold so that the nose of the hog does not touch the ground. After the carcass is hung up it should be rinsed with clean warm water and scraped clean with the sharp ends of a knife. The final rinsing should be made with cold water.

Opening the Carcass: The carcass should be opened for removal of the internal organs before the carcass is removed from the scaffold. To open the carcass a definite procedure may be followed. First, the knife should be inserted in the place where the hog was stuck and moved upward through the breast bone.

In older hogs when the breast bone is very hard to cut, the opening should be made about one-fourth inch to the side of the middle of the breast bone where it is softer. In cutting through the breast bone care should be taken not to cut beyond the ribs



Fig. 11-5. Opening the Carcass. After the opening is made the internal organs are removed.

(Courtesy, USDA)

into the stomach. Second, the knife should again be placed in the hole where the hog was stuck and the cut should be made downward to the point of the jaw. A cut should then be made on each side of the tongue and the tongue lifted out. Third, beginning at the other end of the hog a cut should be made downward between the hams. The white membrane between the hams should be followed to the pelvic arch. The pelvic bones may then be separated by splitting the center seam with the point of the knife.

Fourth, the abdominal cavity may be opened by placing the left hand inside just below the pelvic opening, and using the fingers to guide the point of the knife down the middle line of the belly until this cut joins the split breast bone.

Removing Intestines, Liver, and Lungs: The intestines should be allowed to partially roll out and hang. The bung should be loosened by cutting on both sides and then behind it. This should then be pulled down past the kidneys, being careful to leave the kidneys and kidney fat attached to the carcass. The intestines should be grasped with the left hand below the kid-



Fig. 11-6. The Split Carcass. The split is made down the center of the back. (Courtesy, USDA)

neys and pushed down with the right hand until they are loosened from the back bone. The stomach may then be rolled out and the liver loosened.

With the intestines in the left hand, the diaphragm should be cut through and the artery loosened along the backbone. The heart and lungs should be pulled down and out through the ribs, and finally the entire mass should be cut off at the gullet. The heart, tongue and liver should be separated and placed in cold water to clean and cool. The head and ribs should then be rinsed with cold water and the entire carcass wiped dry.

CHILLING THE CARCASS

The chilling of the carcass is one of the most important procedures in the whole process of curing meat. Cutting and salting warm meat detracts from its appearance, flavor, and keeping qualities. To hasten the chilling, the carcass should be split down the center of the backbone with a saw. The head should be cut down through the center to the nose gristle.

When the backbone is to be used as fresh or canned meat, the carcass should be split on the side of the backbone rather than down the center. When several hogs are killed, and more backbone is available than needed, most of the carcasses should be split down the center of the backbone in order to produce a maximum of cured meat.

The removal of the leaf fat and laying back of the hind flank also aids in the rapid cooling of the carcass. The ideal temperature for cooling meat is 34 to 36 degrees Fahrenheit. The carcass should be held at this temperature between 18 and 24 hours. Freezing temperature causes a frozen crust to form on the outside of the meat thus holding the animal heat around the joints. When the weather is too warm, the bacteria multiplies so rapidly that the meat spoils.

CUTTING UP THE CARCASS

The procedure discussed below should be followed in cutting up the carcass.

1. *Head.* The head should be removed at the atlas or first joint. The jawl should be cut off, trimmed squarely, and put aside for curing. The rest of head should be trimmed for sausage, head cheese, scrapple, and lard.

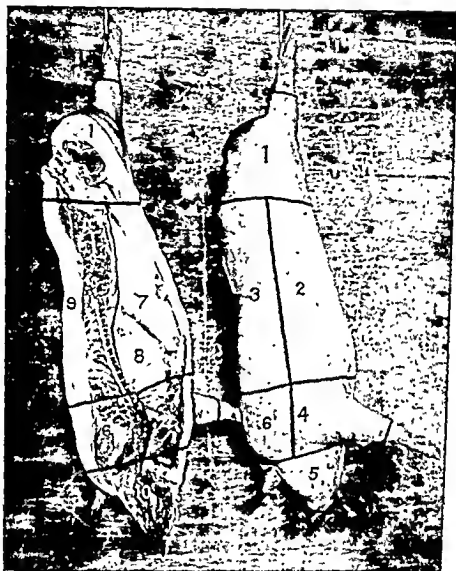


Fig. 11-7. Guide for Cutting Up Carcass. The carcass should be cut up as indicated by the black lines. This carcass has too much fat. (Courtesy, USDA)

2. *Shoulder.* The shoulder should be sawed off across the third rib parallel to the cut made in removing the head. The neck bones and shank are then cut off. The shoulder may then be trimmed neatly and cured if desired. Another way to use the shoulder is to cut off the butt or top of shoulder. In doing this the fat is removed for lard and the butt may be used as fresh or canned roast. The remainder of the shoulder may be trimmed and cured, or boned and used for snusage as desired.

3. *Ham.* The ham should be removed at right angles to the shank at a joint about one and one-half inches in front of the

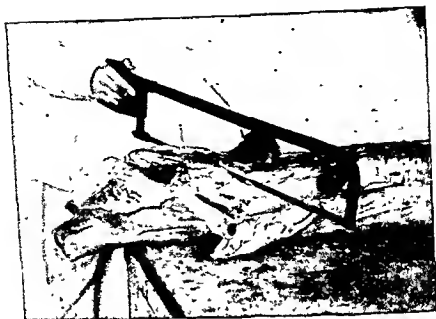


Fig. 11-8. The Ham Being Removed. It should be removed at right angles to the shank at a joint about one and one-half inches in front of the pelvic bone. The saw should be used only where necessary. All the cutting should be done with a sharp knife if possible. (Courtesy, USDA)

pelvic bone. It should be trimmed neatly and the shank removed. It is then ready for curing.

4. *Bacon.* The middle should be separated into the back and belly. This may be done by cutting parallel to the back—beginning at the lower edge of the little tenderloin muscle where the ham was cut off, and ending at the lower edge of the backbone at the shoulder end. The spareribs should be removed and the bacon piece squared and made ready for curing.

5. *Loin.* The fat from the back may be removed and used for lard. The loin can then be used for roasts or chops, either fresh or canned.

With this method of cutting, practically the entire carcass can be cured, as the loin will take a mild cure very satisfactorily. Whatever method of cutting is used, the pieces should be carefully trimmed, especially those to be cured. All flaps and folds should be trimmed away as it is at such places that spoilage most frequently starts.

CURING PORK

The two main methods of preserving pork are curing and canning. The hams, shoulders, and bacon are usually cured.

There are two principle methods of curing, namely: (1) dry curing; and (2) brine curing.

Dry Curing: The dry cure in most cases is preferred since it is quicker and is more adapted to changeable weather. The ideal temperature for dry curing is from 38 degrees to 42 degrees Fahrenheit. The length of time that this temperature should be maintained will depend upon the size of the cut of meat. About $1\frac{1}{2}$ days of curing should be allowed for each pound of meat per piece. Large hams should be kept in curing process 2 days for each pound of weight. On extremely cold days the meat takes very little if any salt. These days should not be counted in calculating the length of the curing period.

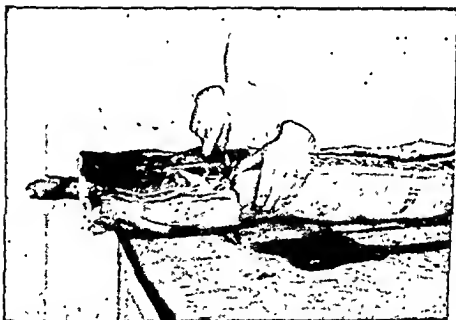


Fig. 11-9. Cutting Off Shoulder. The shoulder should be cut off across the third rib parallel to the cut made in removing the head. (Courtesy, USDA)

In some sections of the south the temperature during the winter months very often fluctuates to the extent that many days will have a temperature above 40 degrees. In these areas it is best to use artificial refrigeration. Many communities are building cooperative refrigeration plants in connection with canning plants. In these plants farmers are able to cure meat at a minimum cost. There are many commercial refrigeration plants that have facilities for curing meat at a nominal cost to farmers.

Extremely large pieces of meat are difficult to cure. Extra large hams and shoulders should be boned, rolled, and tied before curing is started.

Dry Sugar Curing: A mixture of salt, sugar, and saltpeter is generally used for preserving and curing pork. The sugar improves the flavor of the meat and the saltpeter helps to give it a more attractive color. Sometimes pepper is added to improve the flavor.

The following mixtures are recommended for dry sugar curing for each 100 pounds of pork:

Mixture No. 1

7 lbs. salt

3 lbs. brown sugar

2 oz. of saltpeter

Mixture No. 2

8 lbs. salt

2 lbs. brown sugar

2 oz. of saltpeter

Mixture No. 3

7½ lbs. of salt

2½ lbs. granulated sugar

2 oz. saltpeter (4 tablespoonfuls)

4 oz. black pepper (17½ tablespoonfuls)

1 oz. red pepper, if desired (6½ tablespoonfuls)

The ingredients should be thoroughly pulverized and mixed. The mixture should be applied in three applications. The first application, ⅓ of mixture, should be made after the meat has been cooled off and trimmed. The second application, ⅓ of mixture, should be made on the third day, after which the meat should be repacked. The third application should be made on the fifth or sixth day. The meat should then be packed with the skin side down and allowed to remain for about 1½ to 2 days for each pound of weight of the largest piece.

Brine Curing: When brine cures are to be used the following recipe is recommended: 7½ lbs. of salt, 2½ lbs. of sugar, 2 oz. of saltpeter, 4½ gal. of water for each 100 pounds of pork.

Some of the dry ingredients should be thoroughly rubbed into the pieces of meat. The meat should then be packed in large

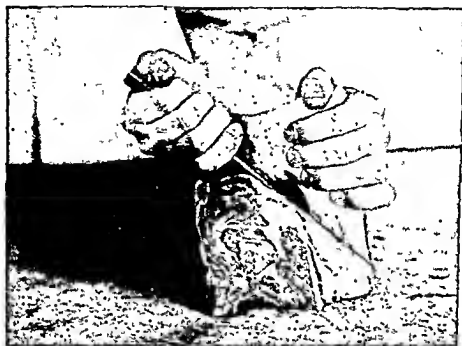


Fig. 11-10. Removing Fat from Loin. The fat should be removed from the loin and used for lard. (Courtesy, USDA)

stone jars or oak barrels with the skin side down, except the top layer, which should have the skin side up. The pieces should be weighted down with hard burned tile or brick or large pieces of hardwood. Pine wood should not be used.

The remainder of the ingredients left after rubbing should be dissolved in boiling water. After the brine has cooled, it should be poured over the meat so that each piece is completely covered. To insure uniform curing the meat should be repacked after 7 days and then again in about 15 days. Meat should remain in the brine from 4 to 8 weeks, depending on the size and thickness of the individual pieces.

If the brine solution should show signs of becoming sour a new brine solution should be made. The strength of this solution should be reduced somewhat. The meat should not be allowed to cure quite as long since it is already partly cured.

Keeping Meat for a Short Period: The following mixture may be used for keeping 100 pounds of meat for a short time:

7½ pounds salt
 2½ pounds sugar
 2 oz. saltpeter
 5½ gallons water

This mixture should be placed in a barrel or a large crock containing a little water. It should be stirred until all the ingredients are dissolved. Additional water should be added to increase the solution to 5½ gallons. The water should be ice cold. The meat may be kept in the brine two or three weeks. It must be eaten soon after it is removed.

CANNING PORK PRODUCTS

Canning Meat: The loins, spareribs, sausage, and in many cases the shoulders might be canned for home use. Suggestions for canning meat are given below.

Meat may be canned at home or in community canning plants in either glass jars or tin cans. Where equipment, such as sealers and pressure cookers are available it is desirable to can meat in tin cans. Sausage and other meat in small quantities may be profitably canned in glass jars.

Most meats should be pre-cooked before canning. It is not usually necessary to cook thoroughly since the meat will be processed in the can. The meat should be prepared as desired for the table. That is it should be roasted, fried, stewed, or made into hash. When partly cooked, it should be placed in plain tin cans or glass jars, and sealed (partly seal glass jars).

The cans should then be cooked under 15 pounds pressure as follows:

Roast ham or roast pork in pint cans cook 60 minutes; in quart cans cook 80 minutes.

Fried ham, ribs, sausage, and chops in pint cans cook 55 minutes; in quart cans cook for 75 minutes.

Fried meat should be cooked until brown and canned immediately.

Some meats may be cut or chopped and placed in cans while raw. It should then be immediately preheated in an exhaust pan until medium done. After preheating the cans should be sealed and cooked at 15 pounds pressure as follows:

Potted meat, meat loaf, and spareribs in pint cans cook for 60 minutes; in quart cans cook for 80 minutes.

Note: 10 pounds pressure for longer cooking may be used.

MAKING SAUSAGE, LARD AND OTHER PRODUCTS

Various portions of the hog may be utilized in making lard, sausage, and other pork products. The lard obtained from hogs that are butchered on farms is an important item. Trimmings from the more important cuts of meat, ground into sausage makes a most delicious food.

Suggestions for Making Sausage: The following is a recipe that has proved successful in making sausage:

25 pounds of pork ($\frac{3}{4}$ lean and $\frac{1}{4}$ fat)

1 cup of salt

3 tablespoonfuls black pepper

$\frac{1}{2}$ tablespoonful cayenne pepper

3 tablespoonfuls of sage

The meat should be cut in small pieces and then mixed with the seasoning ingredients before grinding. It should then be run through the sausage grinder, regulated to turn out the texture of sausage desired.

Suggestions for Making Head Cheese: The head should be thoroughly cleaned. After cutting off the fattest part for lard, it should then be boiled in water until the meat separates from the bones. The meat should be separated from the bones and chopped with a knife. It should then be covered with a part of the liquor left in the pot and boiled from 15 to 30 minutes. It should be seasoned with $\frac{1}{2}$ pound of salt and $\frac{1}{4}$ pound of pepper for each 25 pounds of meat just before removing it from the fire.

Bay leaves, a little ground cloves, and allspice may be added and boiled for a while in the soup. If not condensed enough to form jelly, a little gelatine may be dissolved in cold water and mixed well with the cheese. The meat should then be placed in a wood or glass vessel and pressed with a weighted board. If a large quantity is made the meat while hot may be packed into cans, sealed and processed. In pint cans it should be cooked 50 minutes at 15 pounds pressure.

How to Make Jellyed Pigs' Feet: The pig's feet are scalded, scraped, cleaned thoroughly, and sprinkled lightly with salt and left for 3 to 5 hours. The feet are then washed, put into the steam pressure cooker (on top of wire rack so they are not directly on bottom of canner) with just enough water to cover them. They should be cooked at 15 pounds pressure for 20 to 30 min-



Fig. 11-11. Cutting Up Pork. Future Farmers watching a demonstration in the cutting up of pork.

utes. After this the feet are removed and the bones are carefully picked out. The liquid in which the feet were cooked is strained and the meat added. Salt, pepper, and a small quantity of ground cloves are added to suit taste. It is then reheated to the boiling point and packed hot in lacquered tin cans or in glass jars. The cans are sealed while hot (glass jars partly sealed) and cooked 60 minutes at 15 pounds pressure (pint cans).

Suggestions for Making Lard: The temperature of rendering lard should begin at 212 degrees Fahrenheit and increase to 240-255 degrees at the time the lard is completely rendered. Brown cracklings will float indicating that the lard is completely rendered. The lard should be placed in a container with each vessel filled almost to capacity to exclude as much air as possible. The lard should then be set in a dark place. Air and light cause a chemical change that produces rancidity.

Moisture and bits of cracklings will cause souring. Complete rendering to drive off moisture and careful straining prevents souring.

SMOKING CURED MEATS

Most people like the smoke flavor in meat. Smoking is thought to delay the development of rancidity in the fat of cured pork that is stored throughout the summer months.

After meat is cured it should be removed from the pack and washed with warm water. The appearance of the smoked meat will be brighter and the flavor will be milder if the hams and shoulders are soaked in cold water for two hours. The shoulders and hams should then be strung through the shank with a strong cord. Do not use wire, for it often becomes rusty. The bacon should be hung with a bacon hanger, so that it will keep square while smoking. The cured meat should be hung in the smoke house for a day before smoking is started, in order that the pieces may become thoroughly dry. If wet meat is smoked, it will have a streaked appearance.

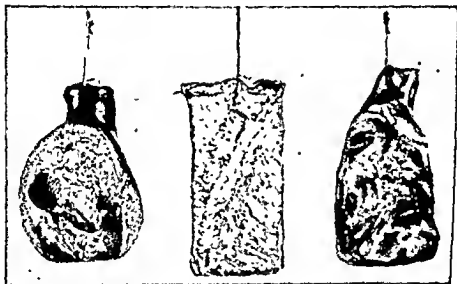


Fig. 11-12. Cured Hog Meat. This picture shows cured ham, bacon, and shoulder ready for use.

Hardwoods, such as hickory and oak, are the usual fuels for smoking meat. Wood of apple or maple trees, or corn cobs may be used with satisfactory results. Pine or any resinous wood gives the meat an undesirable flavor.

It is well to have a distance of at least ten feet between the meat and the fire. The smokehouse should be well ventilated at the top, in order that the smoke may pass by the meat and on out of the house.

Two days of smoke is sufficient for bacon strips. This amount of smoking gives the hams and shoulders a mild smoke flavor. If a heavy smoke is desired, the larger pieces will require as much as four or five days of smoking.

STORING CURED MEAT

Where one is troubled with insects getting into the cured meat, it may be wrapped in heavy paper and placed in heavy muslin or specially prepared sacks. After the meat has been allowed to dry, following the curing and smoking process, storing should proceed. The strings used to hang the meat in the smoke-house should be removed and the meat wrapped in heavy paper and placed in muslin sacks. In tying the top of the sacks, a double wrap should be made before tying the knot, as it is quite important to tie the sacks properly in order to keep the insects out. As a further precaution, the sacks may be painted with a "yellow wash" to help protect them from mold and insects. Ham or bacon should never be stacked in a pile after the "yellow wash" has been applied.

The following are the ingredients needed for enough "yellow wash" for 100 pounds of hams, shoulders, or bacon:

Mixture

- 3 pounds barium sulfate
- 1 oz. glue (dry)
- 1 $\frac{1}{4}$ ounces chrome yellow
- 6 oz. flour

The ingredients should be mixed as suggested below. Half fill a 2 $\frac{1}{2}$ gallon pail with water and mix in the flour, breaking up lumps thoroughly. Mix the chrome yellow in a quart of water in a separate vessel, add the glue, and pour both into the flour-and-water mixture. Bring the whole to a boil and add the barium sulfate slowly, stirring constantly. Make the wash the day before it is required. Stir frequently while using, and apply with a brush.

The meat should then be hung in a dry place for use as needed.

FREEZING PORK PRODUCTS

It is not generally desirable to freeze and store the whole carcass of the hog in a locker or home freezer. Salt cured pork is desired by many and perhaps the major part of the pork should be cured. However, loins, pork chops and sausage have been satisfactorily frozen and stored for six months. Avoid

freezing pork or sausage with much fat. Carefully wrap each piece separately.

Before planning to place pork in home freezer check plans with State Agricultural College. Read carefully the directions for freezing and storing meats in a home freezer.

SUMMARY

"Hog-killing" during a cold season is still a special time on many farms in the South. Use of slaughter house, locker plants and other facilities is quite common in some sections. In any case, to know how to properly kill hogs and cure pork is an important part of growing hogs.

Some simple but necessary equipment will make the job of hog-killing easier and better. This equipment needs to be ready for use before killing hogs.

Practices followed for years in killing hogs may not be the best. Chasing the hogs, shooting to kill, and other such practices should be changed.

The idea that sticking the hog is less humane than shooting or stunning is not true. Furthermore, the hog bleeds better if sticking is properly done as quickly as possible.

Chilling the carcass at once is an important step in curing meat, and is often neglected.

Cutting up the carcass should be done following a "standard plan." This must be done if cuts are to be sold, and it gives better curing, too.

In spite of some sections of the South being famous for "Country Ham," many farmers do a poor job of curing meat. Severe losses are still suffered, or poor flavored meat often results—all from improper curing.

Unless the method of curing on the home farm is highly satisfactory, a careful plan of curing should be developed and followed. Specific suggestions can be secured from the State Agricultural College.

Smoking meats also calls for special attention—but well worth the trouble of careful planning.

PROBLEMS AND ACTIVITIES

1. What amount of pork and lard is needed for a family of five?
2. Calculate the pork requirements for the individual family.
3. Hogs at what weight are most economical to kill?
4. What things should a farmer decide and do in butchering hogs?
5. What are the most common causes of poor flavor and spoilage of pork?
6. Discuss sticking of live hogs as compared with stunning the hog before bleeding.
7. Should the heart of a hog be "stuck" or should the arteries be cut?
8. What is the main point to consider in scalding hogs?
9. Discuss the importance of chilling the carcass.
10. What cuts of meat should be made? Where should each be made?
11. What are some curing recipes for pork?
12. Explain the steps in curing meat.
13. What is the place of canning in the preservation of meat?
14. Visit a farmer noted for curing hams. Ask him to explain the steps he follows.
15. Visit a place where hogs are slaughtered. Observe each step in the process.
16. Write State Agricultural College for latest bulletins on curing pork.

SECTION IV
BREEDING HOGS

CHAPTER 12

General Problems in Breeding Hogs

There are many problems connected with the breeding of hogs. The fundamental purpose of a breeder is to improve his stock. This can be accomplished in two ways: (1) through the use of good practices in feeding and caring for hogs, and (2) through the use of good breeding animals which possess the desirable characteristics that are being sought.

Apparently, "just anybody" cannot become a successful breeder of hogs. This statement is based upon the fact that many hog growers in the past in the South have failed as hog breeders. That is, they seemed to be able to make money on feeding hogs for the market but were unable to succeed as breeders of hogs. There may be many reasons for such a situation, but the main one is perhaps the failure to understand and cope with the special problems involved in breeding hogs. It is a highly specialized job requiring careful and intelligent planning. Breeding hogs is not an "in and out" business, but must be built upon a sound long-time program.

The proper methods of feeding and caring for hogs are discussed in other chapters of this book. This chapter deals only with general problems of breeding hogs. The chapters following will consider selecting breeds and individual animals, as well as setting up a system of breeding hogs. It includes information regarding the following: (1) losses incurred by hog growers as a result of the use of poor quality swine; (2) facts regarding systems of breeding; and (3) laws of heredity.

Breeding and Feeding Important: Good breeding and good feeding practices must be used if success is made in growing hogs for market or for breeding purposes. It is useless to attempt to breed outstanding animals from the standpoint of inheritance unless they are fed well enough to develop those good characteristics that should be passed on to the offspring by the parents. Feeding and breeding must go together if desirable results are to be obtained.

Poor Quality Swine Not Economical: Too many hogs in the herds of the South do not possess the desirable characteristics

that must be present if hog growing is to be most profitable. The average pig of nondescript breeding is very poor in type and quality. Most such animals lack the characteristics that should be present in a good market type hog. They lack quality and refinement. This statement does not refer merely to the appearance of an animal, although that might make some difference. The quality and refinement as used here will mean dollars and cents in the pocket of the breeder producing such quality hogs.

Poor quality hogs are usually unprofitable because they cannot be sold at a price as high per pound as good quality hogs. The packers or meat processors cannot pay as much for inferior type hogs due to the fact that they usually produce poor quality cuts of those parts of the carcass that demand the highest market price. This means that cuts such as the hams and loins are often poor in quality and make up an unusually low per cent of the total carcass. Hogs poor in quality and type do not dress out as high per cent of meat as good hogs.

Pigs from small litters always cost more than pigs from large litters. One of the undesirable traits of swine of poor breeding is that the sows and gilts usually produce small litters. Inferior swine cost the farmers of the South great sums of money each year due to the fact that such hogs require much

Fig. 12-1. This Future Farmer showed the champion Duroc boar at the Mississippi State Fair. (Photo, courtesy of Mississippi FFA)



more feed to put on a pound of gain than do hogs of the proper type that possess quality and refinement.

SYSTEMS OF BREEDING

There are several systems of breeding. Every hog breeder must decide which system or systems he will use. The kind of breeding animals with which he starts will determine to a great extent the system to use. These systems of breeding are grading-up, purebreeding and crossbreeding. Inbreeding and linebreeding are sometimes practiced as a part of the purebred breeding system.

Grading-up: The cheapest way to improve the quality in hogs is to mate the best grade females with a purebred boar and thus breed-up or grade-up the herd. By grading-up is meant the breeding of common or native sows to purebred boars.

The rate of improvement by this method is very rapid at first. As the herd is bred-up, the rate of improvement is much less rapid. The first mating of this sort will produce first-cross pigs that are fifty per cent the blood of the breed to which the purebred boar belongs. The second cross will be three-fourths, the third cross will be seven-eighths, and the fourth cross will be



Fig. 12-2. These Beltville No. 1 meat-type hogs are the result of inbreeding carefully done over a period of years. (Photo, courtesy of Inbred Livestock Registry Association)

fifteen-sixteenths. Successfully carrying out this process means, of course, that the purebred boar used must be a desirable individual and the sows used should be the best in the herd. Only the best gilts from each crop of pigs should be saved for breeding.

The following are the principle advantages of the grading-up system: (1) it is less expensive to start than the other systems; (2) it is more simple for beginners; and (3) a good sire mates with all the females in the herd, hence he influences all the pigs farrowed.

Purebred Breeding: By purebred breeding is meant the use of both boars and sows that are purebred and of the same breed. This system of breeding has been the means of permanent improvement of all breeds of swine.

Inbreeding and Linebreeding: Inbreeding means the breeding of animals rather closely related. It is the mating of animals as closely related as full brother and sister, half brother and sister, sire and daughter, dam and son, or first cousins. Even though inbreeding has been the means of the greatest improve-

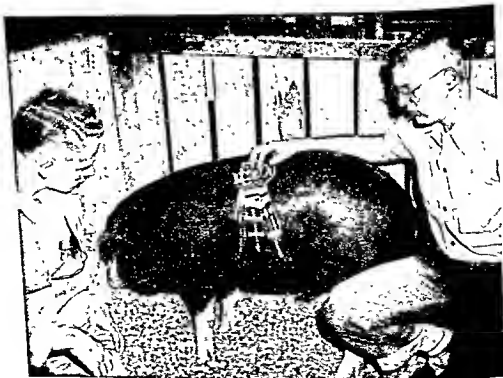


Fig. 12-3. An Alabama Future Farmer showed Grand Champion Boar at the area Purebred Swine show in Columbus, Georgia. (Photo, courtesy of Alabama Vo-Ag Program)

ment in many of our breeds of animals it is generally a dangerous system to use. Inbreeding intensifies the blood of certain individuals. It brings out the characteristics of an individual in a more or less pure form in the offspring of that individual. It makes more prominent the bad as well as the good characteristics of that animal. Inbreeding should be used only in the very best herds and only by men who understand thoroughly the principles of breeding.

Linebreeding means the breeding of animals that are related but not closely related. It is the means of developing, less rapidly than with inbreeding, certain families or strains of animals in a breed. Linebreeding emphasizes the influence of an outstanding ancestor or one of a group of ancestors of the animal in question.

The results of a fourteen-year project on swine breeding at the Oklahoma Experiment Station showed that: (1) inbreeding tends to reduce the size of litters, the birth weight, the weaning weight, and the rate of daily gain in pigs; (2) inbreeding fixes type quickly; (3) it is possible through rigid selection and moderate inbreeding to fix desirable types in inbred strains.

Judging from these results, inbreeding apparently brought about a decline in many of the factors affecting vigor in swine

Fig. 12-4. Sale of Hampshires for breeding by Chinguapin Farm, Tyron, North Carolina. (Photo, courtesy of John Tart, Secretary, North Carolina Hampshire Association)



and is not generally recommended for the production of market hogs.

Crossbreeding: By crossbreeding is meant the mating of two purebred individuals of different breeds, as, for example, the mating of a Berkshire boar to a Hampshire sow or a Hampshire boar to a Berkshire sow.

Crossbreeding also refers to the breeding of two grade animals of different breeds as the mating of a grade Poland China sow to a grade Duroc Jersey boar. Fundamentally, crossbreeding means the mating of individuals of dissimilar breeding or characteristics.

Experiments have shown that crossbreeding generally has the effect of increasing the vigor and improving the feeding qualities of swine. This increased vigor is known as heterosis or hybrid vigor. Crossbreeding has become popular in the production of market hogs in some parts of the United States. The Missouri, Minnesota and other Experiment Stations made a special study of crossbreeding swine for the past several years. The crossbred pigs excelled the purebred pigs in the following points: birth weight per litter, number of pigs farrowed per litter, number of pigs weaned per litter, weight at weaning, rate of gain, and economy of gain.

Crossbreeding has been successfully used in England, Denmark, and Scotland in the production of market animals. By the use of crossbreeding many outstanding strains of swine have been produced in breeding projects conducted by various experiment stations in this country. The Landrace breed imported from Denmark by the United States Department of Agriculture and the Iowa Experiment Station has been used extensively in producing numerous crosses. Some very good strains have been developed from some of these better crosses.

There is one system of crossbreeding called *crisscrossing*. This system is being used by some of the larger commercial breeders of hogs. In *crisscrossing*, there are three breeds of hogs used instead of two breeds. For example, in using Duroc, Poland China and Tamworth, it might work like this: (1) cross a purebred Duroc boar with a purebred Tamworth sow; (2) a gilt from this crossbred litter would then be bred to a purebred Poland China boar; (3) a gilt from this cross would then be bred to a purebred Tamworth boar; (4) then gilts from this cross would be bred to a Duroc boar. This would complete the three-way

breeding called *crisscrossing*. To keep this system going would necessitate rotating boars starting with the Duroe followed by Poland China then the Tamworth boar, in that order. In such a crisscross breeding program, gilts would be selected only from sows producing large litters of fast growing pigs.

Misunderstanding about Crossbreeding: There has been some misunderstanding about crossbreeding in hogs. Some purebred breeders have felt that some of the research work in crossbreeding has been detrimental to the purebred hog business. Some research workers have been criticized for their work in crossbreeding hogs. A clear understanding of the major purpose of crossbreeding as well as the results of research in this area will clear up the matter.

Crossbreeds do not replace purebred hogs. It is not really a question of "purebreds vs. crossbreeds." In fact, crossbreeding depends entirely upon purebreds. Improvement resulting from crossbreeding is dependent upon purebred swine. *The purpose of crossbreeding is to improve the proficiency of pork production.* It is a complicated process and should be studied very carefully if a breeder expects crossbreeding to result in the most desirable meat animals.

THE PROCESS OF REPRODUCTION

Swine, like all other higher forms of animal life, reproduce by means of special reproductive organs. These special reproductive organs produce the sex or germ-cells which in the male are known as sperms or spermatozoa and in the female the eggs or ova. Every pig has its origin when two of these germ-cells, one from the boar and one from the sow, unite.

How a Pig Is Formed: The eggs or ova developed in the female are produced by special organs called ovaries. They are located in the loin region in the rear and below the kidneys. About every twenty-one days during the breeding season the sow produces or ripens a number of these eggs. The ripening of these eggs produces what is known as the "heat period." The eggs, when ripe, rupture the ovary walls and drop into the upper part of another section of the reproductive organs called the Fallopian tubes. The eggs go by gravity, and motion of the thread-like cells of the tube, to the uterus or womb.

The sperm or male germ cells are produced by the testes, the part of the reproductive organs of the boar corresponding

to the ovary of the sow. Before the eggs can be fertilized, or union take place, it is necessary for the sperm to travel several feet. In the process of mating the sperms are deposited by the male in the vagina or uterus of the sow. They must go through the uterus, the horn of the uterus and most of the Fallopian tube where the sperm finds the eggs and unites with it marking the beginning of a new individual. The uniting of these two germ-cells is known as fertilization. The egg-cells cannot be seen with the naked eye but they are much larger than the sperm. The shape of the egg is round and that of the sperm is elongated. The sperm looks somewhat like a tadpole and travels by means of a tail.

The sow produces from fifteen to twenty eggs. Not all these are fertilized and not all survive after fertilization. The male at a single service will produce from one-half to three million sperms.

THE LAWS OF HEREDITY

The small size of the sperm as compared to the egg does not mean that the male contributes less to his offspring than does the sow. The hereditary influence is materially the same. The egg has a food supply necessary to sustain life during fertilization and until conception is complete. The hereditary material that is passed on to the offspring is carried in the two germ-cells that unite.



Fig. 12-5. The short-nose of the Berkshire is one dominant characteristic passed on to the pigs. (Photo, courtesy American Berkshire Assn.)

Every individual is made up according to characteristics it inherits from its sire and dam. For example, the Poland China pig is black for a certain reason. A pig with desirable characteristics has those characteristics because they are present in the ancestry of the pig. For these reasons it is very evident that breeding stock should be very carefully bred and selected.

Each cell in the body of the pig is composed of various parts common to the cells of most animals and plants. The integral or basic part of this is known as the nucleus. In each nucleus is found a definite number of thread-like protein substances known as chromosomes. In these chromosomes are found the genes or factors which are the definite substances that are passed from



Fig. 12-6. Breeders have the problem of producing meat-type hogs, yet conforming to the breed characteristics. These Poland Chinas seem to do both. (Photo, courtesy of Poland China Record Association)

the sire and dam to their offspring. The reproduction cells, as stated previously, are formed in the reproductive organs of the animal. During the process of the formation of the sperms and eggs the pairs of chromosomes separate and only one chromosome of a pair goes to either the sperm or, in the case of the female, to the egg.

When the sperm and egg unite during the process of fertilization one cell is formed which is the beginning of a new individual. This gives that new individual the same number of chromosomes and factor pairs found in each of the parents. That being true, the new individual gets one-half of its inheritance

from the sire and one-half from the dam. Each pig gets a factor, or set of factors, for each characteristic it possesses from the sire and one or a set for the same characteristic from the dam. All factors possessed by animals are transmitted to their offspring in that manner. In some of his characteristics the pig may resemble the sire and in other traits he may resemble the dam. In some he may partly resemble each and in some characteristics he may resemble animals farther back in his pedigree.

Generally speaking, the hereditary make-up of the pig, his type or conformation, color, vigor, feeding qualities, and in fact, every characteristic is the result of the hereditary influence he received from his sire and dam and through them from his entire ancestry. The resemblance shown between the individual pig and his ancestors is the result of the operation of the law of heredity. Through this law "like tends to beget like."

A common illustration of the inheritance of individual characteristics is brought forth in the results of the breeding of white animals (Chester White) to black animals (Poland China). The resulting offsprings will all be white in color. Each offspring receives from one parent a factor for white color and from the other parent a factor for black color. Since the white color exerts a stronger influence, or is what is commonly known as dominant over the black factor, the pigs are all white. This is known as "dominance." If two of these first-cross offspring were mated together the resulting offspring would be in proportion of three white pigs to one black pig. This type of inheritance is what is known as common or Mendelian inheritance. In that case there is only one factor from each parent contributed toward the color of the pig. Most characteristics of an animal are controlled by more than one factor. The type of pig, for instance, is determined by many factors working together.

Prepotency: Prepotency is the ability of an animal to impress on his offspring his own characteristics to the exclusion of those of the other parent. The sire influences many more offspring in a herd than does the dam, and for that reason prepotency is more desirable in the sire than in the dam. A prepotent sire can be of the greatest influence in the building-up of a herd. Of course, a sire can be prepotent in undesirable as well as desirable characteristics, but in general usage, prepotency is thought of as having to do with desirable characteristics. A boar



Fig. 12-7. Naturally, these Duroc pigs will be red and have other characteristics similar to the sow and boar. (Photo, courtesy of Duroc Association)

can be prepotent for thick well developed loins and hams or other characteristics.

Linebreeding and inbreeding have the practical effect of intensifying the hereditary qualities of animals. For that reason prepotent animals are usually either linebred or inbred. As shown by experimental studies, the result of selecting animals that are rather closely bred for certain characteristics show that they produce germ-cells which are more alike in their hereditary qualities; and as a result there will be fewer differences between the hereditary qualities of the sperms on one hand and eggs on the other. Pigs from a mating of that kind are likely to be more prepotent for certain characteristics than are pigs resulting from germ-cells from decidedly unlike animals.



Fig. 12-8. The Landrace is a different type of hog bred for the purpose of developing hogs with long, lean bodies. (Photo, courtesy of S. J. Morris, Luverne, Alabama)

Relative Influence of Sire and Dam: It is generally true that the sire and dam have an equal influence on the characteristics of the offspring. As has been seen, the dam forms an egg-cell and the sire contributes a germ-cell to unite with it. Each of these germ-cells contains a complete set of factors or characters for the new individual. Some of these characters from the dam may dominate the same character from the sire and in a number of cases the reverse might be true. Usually the influence of certain characters blend in the resulting offspring. If one parent is better bred than the other one it will for that reason be more

prepotent for certain characteristics. The old theory, that the sire will determine certain characteristics and the dam certain other characteristics in the offspring, was long ago abandoned.

The boar is the most important individual animal in the herd. This is true because he has so many more offspring than any one sow. However, only by checking the performance of the offspring of a boar can the real value of a boar be determined. Such testing of a boar by the performance of his offspring is called *progeny-testing*. This is quite a different way of testing a boar than by the old method of judging by looks and how well he conforms to a scorecard. Although appearances may have considerable value from the standpoint of breed characteristics, the testing that will pay off at the market place is the *progeny-testing*.

The information in Table 20 was compiled from results of progeny-tests from 12 different boars reported at the Missouri Experiment Station.

Although the boar is important, it should be remembered that the most desirable pigs cannot be produced without the right kind of sow. *The sow is also important.* In fact, pigs in a litter are influenced more by the sow than by the boar. In addition, to contributing one-half the influence on pigs from the standpoint of heredity, as explained earlier, the sow influences the pigs from the time of conception to weaning. The Missouri Experiment Station has reported considerable differences between pigs due to the influence of the sow. This is indicated in Table 20.

Fig. 12-9. The white shoulder band is the "trademark" of the Hampshire. (Photo, courtesy of Hampshire Swine Registry)



HOW A GOOD HERD IS DEVELOPED

The development of a good herd of hogs is dependent upon many factors. As was stated in the beginning of the chapter, feeding and breeding must be carried along together. A group of pigs improperly fed and cared for cannot show the real worth of the breeding back of them. In other words, it requires good management to bring out the good qualities of a pig.

Selection, which will be discussed in a later chapter, is absolutely essential in the development of a good herd of hogs. The best individuals, that is, those individuals coming the nearest to

Table 20. Differences in Performance and Carcass Quality of Pigs from Different Boars.

Trait Studied	Average		
	Low Sire	All Sires	High Sire
Average daily gain (weaning to mkt.)	1.56	1.64	1.74
Lbs. of feed per 100 lbs. of gain	296	321	345
Carcass backfat (inches)	1.32	1.48	1.63
Ham muscle area (sq. inches)	28.8	29.6	30.3
Loin muscle (sq. inches)	10.0	11.2	12.4
Carcass value 200-lb. pig (dollars)	38.66	40.41	41.98
Litter size daughters mid-pregnancy	5.3	9.2	11.5

From "Breeding Methods for Profitable Pork Production," John F. Lasley.

Fig. 12-10.

Table 21. Difference Between Pigs of the Same Breeding That Are Due Mostly to Differences in Breeding of the Sows.

Trait Studied	Breeding of Sows	
	Inbred Durocs	Landrace-Poland Cross
Number of litters	7	7
Number of pigs weaned per litter	7	9.3
Av. daily gain weaning to market, lbs.	1.63	1.51
Feed per cwt. weaning to market, lbs.	282	310
Live backfat thickness at 200 lbs. (in inches)	1.65	1.54
Body length, inches	40.4	41.7
Pounds per litter at 154 days	1281	1658

From "Breeding Methods for Profitable Pork Production," John F. Lasley.

Fig. 12-11.

possessing the characteristics desired, must be selected for future breeders. One must remember in breeding hogs that there are bad characteristics transmitted to the offspring just as there are good ones. The aims of the breeder are to eliminate as far as possible these bad characteristics and introduce and maintain as far as possible the good characteristics.

Good prolific sows that are excellent mothers are fundamental in the development of a good herd. The sows must be capable of producing large litters and weaning a large number of thrifty, well developed pigs. The ability to produce large litters is largely an inherited characteristic—thus, it is always well to select breeding animals from large litters.

In the past very little attention has been paid to performance in the swine herd. With poultry there is the yearly egg production and the weight of the egg as a measure of the hen's worth. With dairy cattle the yearly milk and butterfat production is an index of the performing ability of a dairy cow. By having the records on the dam and daughter one is able to determine the value of a bull.

Tests that have been carried on by the Department of Agriculture and by various state experiment stations have shown that there is a vast difference in the amount of feed required to put on a pound of gain by pigs sired by different boars. In developing a good herd of hogs one should select the breeding animals from the boars that have shown their ability to transmit the characteristics which make for rapid gain, economical gain, and acceptable type and conformation. Boar testing and record-of-performance testing will become more and more important in the development of outstanding individuals and the establishment of superior strains.

COMMUNITY BREEDING

Many breeds of farm animals have been developed by community breeding. On the Island of Jersey, off the coast of France, there was a law passed many years ago prohibiting the importation of any cattle except for immediate slaughter. As a result there are no cattle on the Island today except Jersey. In Europe community breeding of farm animals is the rule but in America that is not the case. There can be many good examples sighted, however, of community breeding in the United States.

The advantages of community breeding are many. One breed, whether a grade or purebred, is better for a community than many breeds. Where several breeders in a community are growing one breed of animals, buyers will go more frequently to that community to purchase breeding stock because they can have the privilege of more selection and the possibility of buying a large number of animals. Community breeding makes it possible for the breeders to exchange sires. This, however, is a more desirable feature in dairy cattle breeding than in the case of hogs. A small breeder has a better chance to sell his good stock if he is in a community where there are several like breeders. Another



Fig. 12-12. Spotted Poland China has developed into a leading breed in some sections. (Photo, courtesy of National Spotted Poland China Record)

advantage in community breeding is that the farmers of the community can get behind one breed of swine and promote that breed. The cooperation of the group often means much in stimulating better production and salesmanship. The spirit of friendly competition enters into a community breeding project which may result in a number of farmers developing better herds than would be the case otherwise.

SUMMARY

There are many problems in breeding hogs if one is to do a good job. Their solution requires an understanding of the principles of breeding animals.

Breeding for proficient production of pork calls for good management practices. As in the case of other problems in grow-

ing hogs, breeding is not an isolated problem to be solved by itself. It is closely related to feeding, sanitation, and other management problems.

A breeding program with hogs requires long range planning for effective results. It is a more complicated phase of growing hogs than feeding out hogs for market.

Crossbreeding of hogs has been of great interest in recent years. This is the use of two or more purebred lines in a planned program of crossbreeding. The use of three breeds in a planned program of crossbreeding is called *crisscrossing*.

Studies have shown that both the boar and the sow have great influence on the pigs. While the boar influences more pigs, the sow has perhaps even greater influence since she affects the pigs from conception until they are weaned.

PROBLEMS AND ACTIVITIES

1. How does the pig get its color?
2. What is meant by laws of heredity?
3. What system of breeding hogs is used on your home farm?
4. What is the most common system followed in your community?
5. What is meant by progeny-tested?
6. How does the boar and the sow each influence pigs?
7. Visit the farm of a hog-breeder and talk with him about his problems and how he solves them.
8. Write the Animal Husbandry Department of your State Agricultural College for latest information on crossbreeding of hogs.

CHAPTER 13

Setting Up a Program of Breeding

In order to set up a sound program of breeding, a hog farmer must take into consideration many breeding principles and practices. Most of the general principles of breeding are treated somewhat in detail in Chapter 12. Some of the more important practices that have proved successful are discussed in Chapter 14 and others are dealt with in this chapter. Whether breeding purebred stock or a commercial herd, a farmer must carry on certain good practices if he is to make a success of establishing and breeding an outstanding herd.

A program of breeding hogs must be set up to produce hogs for today and the years ahead. It is not enough to pick a favorite breed, get a few good-looking sows and a boar and be in the hog breeding business. Such a program would not likely last long unless the person had money from other sources to finance it.

The breeder is in the hog business to make money. If he makes money he must not only run his own business on an economical basis but must produce the "right" animals for sale at the "right" time. This presents many problems. Multiple farrowing is one of the recent programs developed to meet some of these problems.

WHAT PHASE OF SWINE PRODUCTION TO FOLLOW

The hog farmer must decide whether he will produce market hogs or breeding stock or both. The direction in which he expects to travel in building his herd will determine whether or not he shall practice inbreeding, linebreeding, or crossbreeding and will also determine whether or not he will establish a grade or purebred herd.

As suggested in Chapter 12 a large majority of the hog farmers should plan to produce only market hogs. To be a good purebred breeder one must be a good feeder and must be able to handle well the details connected with swine production. There is no better way to gain such experience than by first becoming a producer of good market hogs. Some breeds of swine have been

made unpopular in various communities in the South because "would-be" purebred breeders have established herds and attempted to sell breeding stock when they knew nothing of the fundamental principles of breeding or feeding. The result was, of course, that they placed many inferior breeding hogs on the market which proved a disappointment to those who purchased them.

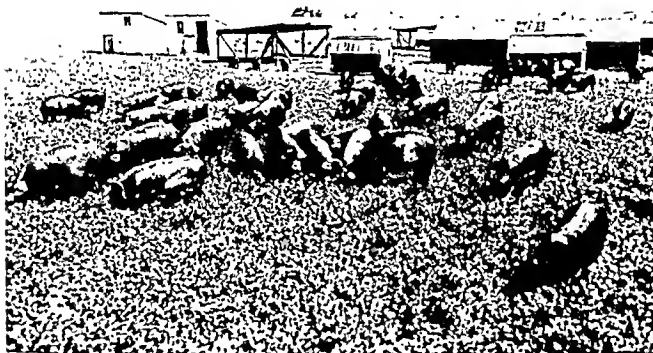


Fig. 13-1. Good pigs from a good herd in a good setting for growing good hogs—good business! (Courtesy, United Duroc Record Association)

All good purebred breeders should have definite plans for marketing a certain percentage of their hogs as market hogs. The best purebred herds produce a certain percentage of hogs that are not good enough to be sold for breeding purposes.

Whether the purebred breeder expects to sell his breeding stock as weaned pigs or carry them on until nearer maturity would influence to a great extent the set-up he would maintain. Marketing the breeding stock as young pigs would mean that the farmer would be required to have less feed than he would if he carried the breeding stock to maturity. By selling the breeding

stock young, he would probably want to carry more brood sows than he would if he marketed his breeding hogs at maturity.

Those hog farmers breeding purebreds only, largely to sell as breeding stock, will be called *purebred breeders*. Those farmers breeding hogs largely to sell as market hogs will be called *commercial breeders*.

HOW MANY SOWS TO CARRY

There are several things that determine the number of sows that may profitably be carried in a breeding herd. The following are the things of chief importance: (1) amount of feed that can be economically produced; (2) the equipment and labor available; and (3) method and time of marketing animals.

Many livestock producers have the ambition to increase the size of their herds much faster than they can economically increase the amount of feed and the facilities for handling them. In commercial hog production it is usually to the advantage of the farmer to produce all of his feeder pigs rather than to buy some of them. The cost of raising pigs may amount to as much as the price at which they can be bought, but there is much greater assurance of having high-quality, healthy pigs if a farmer produces his own feeders. One of the surest ways to introduce diseases and parasites in the swine herd is by purchasing feeder hogs.

In the long run, the purebred breeder of swine is better off if he tries to build his reputation on quality, individuality and performance of the pigs he markets, rather than by the number he markets. Whether he sells young breeding stock or old breeding stock will influence to a great extent the number of sows to carry.

HOW MANY LITTERS TO PRODUCE PER YEAR

The hog breeder may plan to produce one litter of pigs per sow per year, two litters or even three litters per year. Producing three litters requires very careful planning and early weaning. Most hog farmers in the South follow the practice of producing two litters per year, usually one in the Fall and another in the Spring.

The idea of producing pigs during the entire year, by breeding sows throughout the year, rather than in the Fall and Spring is now being practiced and may find acceptance in the South.

Time for Pigs to Be Farrowed: The question of the best time for sows to farrow must be determined by each farmer. The location of the farm, the facilities for handling the sows and pigs and the feed available should influence the time of farrowing. For most of the South it is generally thought that February and March are the best months for the spring farrow, which would mean that the fall farrow would come six months later in August and September.

The principal advantage of having sows farrow in the early spring is that there can be available for the sows and pigs during the suckling period an abundance of green grazing such as oats, rye, and rape. Another advantage is that the early farrowed pigs can be marketed in the fall before the usual seasonal decline in prices. Then the farm work is usually not so heavy during February and March and for that reason more time can be given to sows and pigs during the farrowing and the suckling periods. Early farrowed pigs can make the maximum use of green grazing crops during the spring and summer and can be developed into good feeder pigs ready for the grain crops in the late summer and early fall.

For the upper part of the southern region late spring farrowing might be desirable. The amount of equipment necessary for the care of the pigs is less for late farrowing. Late farrowed pigs are less likely, under average conditions, to suffer from anemia and other ills brought about by close housing and limited sunshine. Late pigs can make more of their gain on the new fattening crops produced.

Generally it is preferable to have early spring farrowed pigs. After all, the time of farrowing should be influenced more by the feed supply that can be made available for the pigs during the growing and fattening periods than by any other factors. That is especially true for farmers who grow hogs for the market.

ALL SOWS IN A HERD FARROWING NEAR THE SAME TIME

There are many advantages in having all the sows farrow near the same time. If all the sows farrow within a week or two of each other it concentrates the labor required to look after the sows at farrowing time and during the suckling period. The feeding operations during this period are simplified materially if several litters can be fed at one time. It is better to have the sows farrow near the same time even though each sow and litter

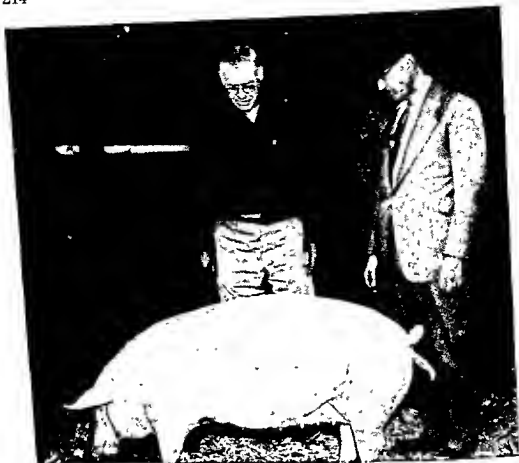


Fig. 13-2. This Landrace gilt had 11 pigs her first litter, 12 pigs in second litter and 12 pigs in her third litter. (Photo, courtesy S. J. Morris, Luverne, Alabama, seen here showing G. B. Phillips, Alabama Hog Specialist, his prize Landrace.)

is kept in separate quarters from other sows and litters during the suckling period. The practice followed on many farms in the South is to run as many as eight or ten brood sows and their litters together during the suckling period. They are placed together after the pigs are from one to two weeks old. The cost of fencing and equipment is materially reduced when this practice is followed.

Makes Parasite Control Easier: It is much easier to carry on parasite control practices, which are becoming more and more important in the South, if the sows farrow near the same time. Only one parasite control set-up is necessary for six to ten sows and litters. If the sows farrow along at different seasons of the year it is very difficult to have an individual parasite control set-up for each sow.

One of the main advantages in having litters farrowed at or near the same time is that they can be handled in groups after weaning to better advantage than if the pigs vary considerably in age. If pigs are near the same age, it makes it a much simpler matter to provide green grazing and fattening crops for growing out and finishing the pigs. Running the pigs in relatively large groups means that larger areas can be grazed or hogged-off, which in turn reduces the amount of cross-fencing necessary. If they are to be carried in dry lots it is decidedly preferable to have all the feeder pigs in one group near the same age, size and weight.

SOWS IN A HERD FARROWING AT DIFFERENT TIMES

The system of breeding sows so that they farrow at different times all during a year is called *Multiple Farrowing*. It simply means breeding some of the sows of the herd one month and some another rather than concentrating so that the sows will all farrow in the spring and again in the fall. This system is best suited to the hog farmer with a large number of sows. As pointed out earlier in this chapter, unless a farmer has a large number of sows it is perhaps best for him to breed all sows as near as possible at the same time for the Spring and Fall litters.

There are several reasons a farmer might consider *multiple farrowing* as a system of breeding hogs in the South. *First*, the weather does not generally get cold enough in the South to make any part of the winter undesirable for farrowing pigs. Furthermore, green grazing can be made available for the sow and litter at any time of the year. *Second*, the amount of equipment and buildings needed may be greatly reduced. That is, the number of pigs raised may be greatly increased without adding more buildings and equipment. For example, if a farmer has 12 sows in his herd and breeds them nll twice each year for Spring and Fall litters, he must provide sufficient building space and equipment for 12 sows and their litters. If he breeds them throughout the year, he could hve only two sows farrowing each month of the year. By rotnting them in different areas there would need to be provision for only two sows nnd litters in nn aren at n given time. Such a program would be worked out so thnt the same two sows would farrow in October and April, another two sows would farrow in November nnd May, and other sows the same way throughout the year. The *third* reason for considering *Multiple*

Farrowing is that hogs would be marketed each month of the year. This would avoid selling all hogs at a low price, however, all hogs would not be ready at the peak price.

One major disadvantage of the system of *Multiple Farrowing* is that it requires more careful planning of all phases of the hog program for the year. Labor might be a problem at farrowing time if the farm has other enterprises requiring peak labor, such as cotton or tobacco. However, this might be an advantage for labor too, if the farmer has a hog business large enough to employ a person full-time. That is, the labor with the hog program would be more evenly distributed throughout the year.

One other advantage to *Multiple Farrowing* should be mentioned. If a lot of hog farmers would follow this plan it would tend to help the entire market situation for hogs. At present, there are peaks of over-supply and lack of supply of hogs at the market and pork from the processing plants. A steady supply of reasonably priced pork products might mean more eating of pork for the year. If so, then all hog farmers would profit by the better year-round marketing.

It is suggested that the hog farmer interested in the system of *Multiple Farrowing* should read all he can on the subject and discuss his situation with a Hog Specialist. It would be well if he could also visit one or more hog farmers where the *Multiple Farrowing Program* is in operation.

AGE OF GILTS BEFORE BREEDING

The age at which a gilt should first be bred depends more on development than on age. A gilt should take her place in the breeding herd as soon as her growth has reached the stage that the demands of maternity will not materially affect her own development. Gilts that are well developed are more reliable as future brood sows than those that are poorly developed. It is better to breed a well developed gilt at seven months of age than a poorly developed gilt at ten.

Experiment station records show that gilts stop growing almost entirely during the lactation period—that is during the suckling period. The demands of lactation seem to be considerably heavier on the animal than the period of gestation. Gilts that are bred too early and not properly fed will likely never develop into well grown, efficient brood sows.



Fig. 13-3. Hogging-Off Corn and Soybeans. Young stock selected for breeding must be properly fed if they are to develop desirable characteristics to make them good breeders. (Courtesy, Georgia Coastal Plain Experiment Station)

Early Breeding Usually Best: Experience has shown that reasonably early breeding tends to establish reliable breeding habits, while late breeding frequently results in poor breeding habits. Early breeding on the average reduces the cost of pigs at birth. The earlier the gilts can be made to produce, the larger will be the saving in feed, investment and risk. For example, if a hog farmer has selected March and September as the time for the sows to farrow, then the gilts added to the breeding herd must be bred so they will farrow either when a year old or when eighteen months of age. If the gilts have been properly fed and developed there is no good reason why they cannot farrow at one year of age and continue to produce two litters per year. On the other hand, with this system of breeding, if the gilts are not well developed and are not properly fed during the lactation and gestation periods small sows will be the result.

AGE OF BOARS BEFORE BREEDING

In general the discussion above regarding the practice of breeding gilts while young is also applicable to the boar. If a boar is properly fed and well developed there is no reason why he cannot do light breeding after he is six months of age. Here again, the feed and care given to a young boar will, to a large



Fig. 13-4. A junior herd sire from an outstanding breeding herd. (Courtesy, Maplehurst Farm, South Boston, Virginia)

degree determine the age at which he can be relied upon as a good breeder.

NUMBER OF MALES TO BE MAINTAINED

The number of males to be maintained by the hog farmer will depend on whether pasture breeding is practiced, and of course, upon the number of sows to be bred. A constructive swine breeder likes to hold a boar in reserve so that if one dies the other can carry one, thus keeping intact the blood lines that are being developed. Such a breeder will also want to use, as far as possible, tried boars. To have a tried boar available for service all along necessitates the proving of young boars from time to time and holding them in reserve. The breeder of purebred swine should be more concerned about this matter of proving or testing of males. The commercial hog farmer can purchase from purebred breeders males sired by proved boars to use to improve his herd.

The number of sows which a boar can safely breed during the breeding season depends on several factors such as the following: (1) age and maturity of boar; (2) vigor and fertility; (3) the length of the breeding season; (4) the distribution of service; and (5) the manner of handling, feeding and caring for boar. A boar should be at his best between the ages of eighteen months and four years. If properly fed and exercised, a boar should be a good breeder for several years after he has reached his fourth birthday.

Practical experience has shown that mature boars properly fed and handled can breed two sows per day and occasionally three during the heavy part of the breeding season. If the sows

are bred so as to farrow their litters within a period of seven to fifteen days it means that the breeding period must be of that duration. Males must be well fed and properly handled to be able to breed an average of one or more sows per day during the breeding season. It is generally thought that a young, vigorous, yearling boar can breed as many sows as can a mature boar.

AGE AT WHICH SOWS AND BOARS CEASE TO BREED

The Boar: The tendency of the average hog farmer is to use young males. Old and large males are often discarded because they develop bad dispositions with age, and because they grow too heavy and have to be used in breeding crates and thus are generally harder to handle. However, a proved boar is a great asset to the hog farmer. When an outstanding boar is discovered he should be used as long as he is a good breeder or until a better one is found to take his place. If males are properly fed and exercised they should be good breeders up to six and eight years of age.

Gilts versus Aged Sows: Many experienced swine growers think that it is more economical to produce pork from pigs farrowed by gilts than from sows. The United States Department of Agriculture made tests comparing the value of mature sows and gilts for producing market hogs.

The following is a brief summary of the results of the tests:

(1) "Pigs can be raised to a marketable weight of approximately 225 pounds more economically when farrowed by gilts than when produced by mature sows;

(2) Gilts required less feed during the gestation period and their pigs made more economical gains during the suckling and fattening periods;

(3) The gilts showed an advantage over the mature sows in the percentage of pigs raised to weaning and market weight;

(4) Mature sows farrowed larger litters than the gilts;

(5) The mature sows weaned heavier pigs than the gilts.

(6) Gilts developed from mature sows were better producers of market hogs than were gilts developed from gilts."

An advantage in the production of pigs from gilts is that those gilts that do not prove to be sure breeders can be disposed of while they will still sell as good butcher hogs.

The purebred breeder cannot rely on the use of gilts in the breeding herd to the extent that the commercial hog producer



Fig. 13-5. This Future Farmer has worked with this champion sow for the show ring as well as for the breeding herd. (Courtesy, Mississippi Vo-Ag Education)

can. It is highly desirable that a gilt or young sow demonstrate her ability as a good breeding animal before her offspring are retained in the breeding herd. Except for the fact that the male has more influence on the total herd than does one brood sow, it is as desirable to have a proved sow as it is to have a proved male.

The Sow: There are many advantages in favor of using a larger number of gilts in the breeding herd and there are many in favor of using mature sows. Mature sows will produce larger litters, heavier pigs at birth and at weaning, and will have demonstrated their ability as mothers and their ability to produce pigs that develop into good market hogs. On the average, mature sows will lose more pigs at farrowing and during the suckling period for various causes than will the gilts. A good brood sow that has proved her worth in the breeding herd should be maintained as long as she is a good producer or until better brood sows are available. Sows are usually economical producers until they are six to eight years of age.

The time of sexual excitement in the female, known as the "heat period" or oestrus, should be understood. The usual signs of heat are certain restless activity on the part of the sow, a swelling of the vulva, frequent mounting of the other sows, and occasionally peculiar, loud grunting sounds.

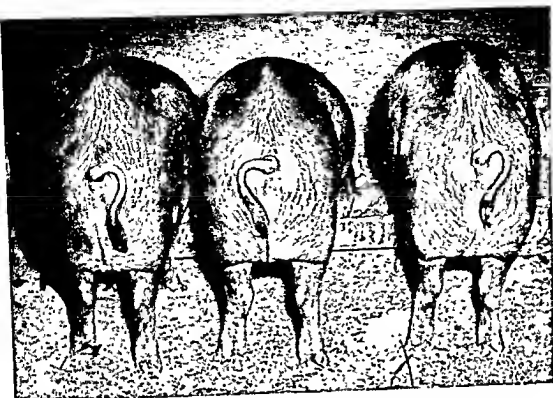


Fig. 13-6. Good meat-type hogs. (Photo, courtesy Oklahoma FFA)

The significance of this period is that the sow is secreting or preparing to secrete the ripened eggs or ova. The approach of heat precedes by a day or two the production of these germ-cells which on fertilization, by their union with the male germ-cells, produce the embryo pigs.

The sow on the average comes in "heat" every eighteen to twenty-four days. After farrowing they usually come in "heat" the third day and they sometimes come in again before the pigs are weaned. Sows will usually come in "heat" from three to seven days after the pigs are weaned.

The first appearance of "heat" occurs in the gilts when they are about five months of age. This marks the attainment of sexual development. Again the feed and care that the gilt has had will influence the development of the reproductive organs. Trials carried on by Robison of the Ohio Experiment Station showed that sows may be bred and safely settled while still nursing their pigs. The sows used in the tests were separated from their litters at night. They were allowed to run as usual with their litters during the day. "Heat" usually appeared after the fourth or fifth night of separation. Early weaning of pigs would result in the sow's coming in heat. These practices are

followed by some breeders when they are trying to produce three litters per year or who for other reasons wish the sow bred early for another litter.

FLUSHING SOWS

Flushing is a practice of feeding the sows unusually well which will cause them to be in a good gaining condition during the breeding period. To have the sows in such condition during the breeding period seems to stimulate all the vital functions and especially to stimulate the activity of the reproductive organs. By giving the sows this stimulant, larger litters are produced. This practice, of course, is most beneficial if used on sows that are in rather poor condition. Sows that are already as heavy as is consistent with vigor and activity should be stimulated if possible by supplying plenty of exercise and green feed.

PASTURE BREEDING VERSUS HAND BREEDING

There are two general systems of managing the sows and boars during the breeding season. One is known as hand breeding which is bringing each sow, as she comes in "heat" to the boar. The second is that of allowing the boar to run with the sows. The best system to follow will be determined by conditions.

The commercial hog farmer with less than ten sows finds the practice of turning the boar with the sows to be satisfactory, as a rule. The main advantage is that it does not require as much of a farmer's time as does hand breeding. This system also has the advantage that the chance of missing the sow when she comes in "heat" is reduced to a minimum.

When there are a large number of sows in the herd it is usually advisable to practice hand breeding. By using that practice many more sows can be bred to a given boar than is possible if the pasture method is used. The practice of breeding the sows just before feeding time in the morning and in the afternoon requires very little extra time. This is especially true if lots are well arranged.

In purebred herds there is usually more than one male to be used in the breeding program, which makes it necessary for hand breeding to be practiced. Unless this method is used the necessary breeding records cannot be kept.

NUMBER OF SERVICES PER SOW

Experience has shown that as a rule only one service is needed in breeding a sow. This is true because several million sperms are liberated by the boar in one service. From tests it has been found that sows are more likely to catch if bred during the later stages of the "heat" period. This is evidently due to the fact that the eggs are not liberated until the later stages of the "heat period." For this reason if a sow is still in "heat" the day after she was bred it is advisable to breed her the second time.

USE OF BREEDING CRATE

Hog farmers as a rule do not favor the use of a breeding crate. This is probably due to the fact that they have had little or no experience with them and because their use requires extra time. The tendency among the market hog farmers is to use young immature boars. When this is the case it is not necessary to use the breeding crate, except when the young boars are bred to rather large sows. When a mature, heavy boar is to be bred to gilts or a young boar to rangy sows, a breeding crate is almost a necessity. Some breeders prefer the use of the breeding crate even though its use is not necessary. In most cases the boar has to be taught to use the breeding crate. Some farmers think that sows are less likely to conceive when bred under the artificial conditions brought about by the use of a breeding crate. It is difficult, however, to see why that should be the case if a good service is had.

LENGTH OF THE GESTATION PERIOD

The time between the breeding of the sow and the farrowing of the pigs is known as the gestation period. The time the sow is suckling her pigs is known as the lactation period. Recent data indicate that the average length of the gestation period in hogs is 114 days. The length of the gestation period will vary from about 110 to 117 days. Studies have shown that mature sows are not likely to carry their litters any longer than gilts. It has also been found that large litters are not any more likely to run over the average period of time than small litters. A gestation table gives the expected farrowing date for any breeding date. (See Fig. 13-7.)

GESTATION TABLE

Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due
Jan 1	Apr. 22	Mar 1	June 20	May 1	Aug. 20	July 1	Oct. 20	Sept. 1	Dec. 21	Nov. 1	Feb. 27		
2	23	2	21	2	21	2	21	2	22	2	21		
3	24	3	22	3	22	3	22	3	23	3	22		
4	25	4	23	4	23	4	23	4	24	4	23		
5	26	5	24	5	24	5	24	5	25	5	24		
6	27	6	25	6	25	6	25	6	26	6	25		
7	28	7	26	7	26	7	26	7	27	7	26		
8	29	8	27	8	27	8	27	8	28	8	27		
9	30	9	28	9	28	9	28	9	29	9	28		
10	May 1	10	29	10	29	10	29	10	30	10	29		
11	2	11	30	11	30	11	30	11	31	11	30	Mar. 1	
12	3	12	July 1	12	Sept. 1	12	Nov. 1	12	Jan. 1	12	Jan. 1	1	2
13	4	13	2	13	2	13	2	13	2	13	2	2	3
14	5	14	3	14	3	14	3	14	3	14	3	3	4
15	6	15	4	15	4	15	4	15	4	15	4	4	5
16	7	16	5	16	5	16	5	16	5	16	5	5	6
17	8	17	6	17	6	17	6	17	6	17	6	6	7
18	9	18	7	18	7	18	7	18	7	18	7	7	8
19	10	19	8	19	8	19	8	19	8	19	8	8	9
20	11	20	9	20	9	20	9	20	9	20	9	9	10
21	12	21	10	21	10	21	10	21	10	21	10	10	11
22	13	22	11	22	11	22	11	22	11	22	11	11	12
23	14	23	12	23	12	23	12	23	12	23	12	12	13
24	15	24	13	24	13	24	13	24	13	24	13	13	14
25	16	25	14	25	14	25	14	25	14	25	14	14	15
26	17	26	15	26	15	26	15	26	15	26	15	15	16
27	18	27	16	27	16	27	16	27	16	27	16	16	17
28	19	28	17	28	17	28	17	28	17	28	17	17	18
29	20	29	18	29	18	29	18	29	18	29	18	18	19
30	21	30	19	30	19	30	19	30	19	30	19	19	20
31	22	31	20	31	20	31	20	31	20	31	20	20	21
		Apr. 1	July 1	June 1	Sept. 1	Aug. 1	Nov. 1	Oct. 1	Jan. 1	Dec. 1	Mar. 1		
Feb. 1	May 23	2	21	2	20	2	20	2	21	2	22		
2	24	3	22	3	21	3	21	3	22	3	23		
3	25	4	23	4	22	4	22	4	23	4	24		
4	26	5	24	5	23	5	23	5	24	5	25		
5	27	6	25	6	24	6	24	6	25	6	26		
6	28	7	26	7	25	7	25	7	26	7	27		
7	29	8	27	8	26	8	26	8	27	8	28		
8	30	9	28	9	27	9	27	9	28	9	29		
9	31	10	29	10	28	10	28	10	29	10	30		
10	June 1	11	30	11	29	11	29	11	30	11	31	Apr. 1	
11	2	12	Aug. 1	12	Oct. 1	12	Dec. 1	12	Feb. 1	12	1	2	
12	3	13	2	13	2	13	2	13	3	13	3	3	
13	4	14	3	14	3	14	3	14	4	14	4	4	
14	5	15	4	15	4	15	4	15	5	15	5	5	
15	6	16	5	16	5	16	5	16	6	16	6	6	
16	7	17	6	17	6	17	6	17	7	17	7	7	
17	8	18	7	18	7	18	7	18	8	18	8	8	
18	9	19	8	19	8	19	8	19	9	19	9	9	
19	10	20	9	20	9	20	9	20	10	20	10	10	
20	11	21	10	21	10	21	10	21	11	21	11	11	
21	12	22	11	22	11	22	11	22	12	22	12	12	
22	13	23	12	23	12	23	12	23	13	23	13	13	
23	14	24	13	24	13	24	13	24	14	24	14	14	
24	15	25	14	25	14	25	14	25	15	25	15	15	
25	16	26	15	26	15	26	15	26	16	26	16	16	
26	17	27	16	27	16	27	16	27	17	27	17	17	
27	18	28	17	28	17	28	17	28	18	28	18	18	
28	19	29	18	29	18	29	18	29	19	29	19	19	
29	20	30	19	30	19	30	19	30	20	30	20	20	
		31	20	31	20	31	20	31	21	31	21	21	

Fig. 13-7.

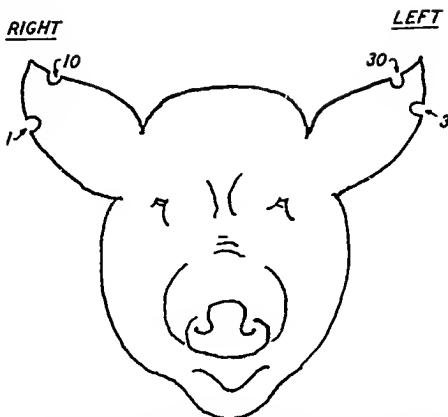


Fig. 13-8. Marking Pigs to Designate Litter Number. This drawing shows a system of ear-notching pigs that will designate the litter number. More than one hundred different litters can be marked by this system.

Litter No. 1—One notch in lower right ear.

Litter No. 2—Two notches in lower right ear.

Litter No. 3—One notch in lower left ear.

Litter No. 4—One notch in lower left ear and one in lower right ear.

Litter No. 5—One notch in lower left ear and two notches in lower right ear.

Litter No. 6—Two notches in lower left ear.

Litter No. 7—Two notches in lower left ear and one in lower right.

Litter No. 8—Two notches in lower left and two notches in lower right.

Litter No. 9—Three notches in lower left ear.

Litter No. 10—One notch in upper right ear.

Litter No. 100—Three notches in upper left ear and one notch in upper right ear.

BREEDING RECORDS THAT SHOULD BE KEPT

Commercial hog producers as a rule do not keep very many breeding records on their animals. This is generally considered a serious mistake. Even the most experienced hog breeders often guess wrong as to the time the sows will farrow. This results in many cases in sows farrowing with the general herd, and under conditions that are usually not favorable to the survival of a high per cent of pigs.

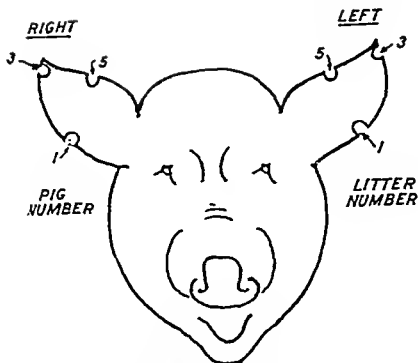


Fig. 13-9. Marking to Designate Litter and Pig Number. This drawing shows a system of ear-notching pigs that will designate the litter number and the pig number.

Litter 1, Pig 2—One notch in lower left ear and two notches in lower right ear.

Litter 4, Pig 8—Left ear: One notch in the end and one in lower part; right ear: One notch in upper side and one in the end.

Litter 14, Pig 9—Left ear: Two notches in upper side, one in the end and one in lower part; right ear: One notch in upper side, one in the end and one in lower part.

There are other systems that may be worked out for numbering both the litter and the pigs in the litter.

The purebred breeder must keep careful records. Where more than one boar service is had that should be recorded and the date the sows were bred should be recorded. Each sow must be identified by an ear tag or ear notch or some other definite means of identification. Each boar must likewise be identified. It is necessary that breeding dates, farrowing dates, and number of pigs farrowed be kept. It is well to keep the number of pigs lost and the cause of such loss.

One of the necessary records to be kept is that of the litters or individual pigs. Some commercial hog breeders and some purebred breeders have litter marks and some develop a system whereby each pig can be identified. In commercial swine

production a litter identification is probably all that is necessary. The same might be true with the purebred breeding herd. Some purebred breeders like to be able to identify each individual pig. One of the best systems of keeping litter records or pig records is to notch the ears. Figures 13-8 and 13-9 show systems of ear-notching that can be used in keeping records of litters or of individual pigs.

REGISTERING HOGS IN BREED ASSOCIATIONS

It is usually a simple matter to fill out the required blanks for registering breeding pigs, provided ample records have been kept. The breed associations require accurate information as to the date the sow was bred, the male to which she was bred, the farrowing date, the number of pigs farrowed, and the number and sex of pigs raised. A good conscientious purebred breeder will certainly keep records to that extent.

To register purebred hogs the beginner can write to his breed association and ask for instructions. The breed associations furnish application blanks and breeding certificates. The names and addresses of the breed associations are found in the appendix.

SUMMARY

Breeding hogs is a job demanding an understanding of many problems. "Anybody can grow hogs" probably does not apply to any part of the hog business, certainly not to a breeding program. The system of breeding best adapted to his own situation must be determined by each hog farmer. The most successful hog breeder will likely be the man willing to study and learn to constantly improve his system of breeding hogs.

Most hog breeders in the South plan to breed all their sows about the same time twice each year so that they will farrow in the Spring and again in the Fall. This system has many advantages. However, it does tend to over-supply the market twice a year.

Multiple Farrowing is a relatively new system of breeding hogs and has not been practiced extensively in the South. It simply means that the sows in the herd are bred at different times throughout the year rather than concentrating at the same time twice each year. This means that farrowing would take place each month of the year, therefore marketing each month.

rather than twice during the year. This will result in more efficient use of equipment and steady marketing throughout the year. A disadvantage is that there would be farrowings in the "busy" season in case the farmer produces cotton, tobacco or other heavy labor crops.

Regardless of the system used, careful plans need to be made for keeping accurate records. These are necessary for the purebred breeder and needed by any farmer breeding hogs. Any improvement in his hog program will be dependent upon records of events and performance of his hogs.

PROBLEMS AND ACTIVITIES

1. What phase of swine production should most farmers follow? Why?
2. What experience should a farmer have before attempting to grow breeding stock for sale?
3. What are the chief factors that will determine the number of sows to carry on a given farm?
4. In the section where you live is it practical to produce two litters of hogs per year? If so, what months should sows farrow?
5. What is meant by *Multiple Farrowing*? Do you believe that this system would work well in your community?
6. At what age should gilts be before they are bred?
7. How old should a boar be before he is used for breeding purposes?
8. The number of sows which a boar can safely breed during a breeding season depends on what factors?
9. At what age do sows cease to be profitable as breeders? Boars?
10. Compare the value of mature sows and gilts for producing market hogs. Which are used on your home farm?
11. What is meant by "heat period"? With hogs how often does it occur?
12. What is meant by flushing sows? Is it a good practice? What is meant by hand-breeding and pasture-breeding? Under what conditions are each of these practiced?
13. Discuss the use of a breeding crate.

14. What is meant by the "gestation period"? Lactation period?
15. What breeding records should be kept?
16. What procedure should be followed in order to register hogs in breeding associations?
17. Visit a good swine breeder, one that is available in or near your community, ask him questions about the practices he carries on in breeding hogs.

CHAPTER 14

Selecting Breeding Stock

Selecting hogs that are to form the foundation of a breeding herd is a matter that should receive careful consideration. Too often insufficient attention is given to this important job. This is particularly true of young breeders who are anxious to breed-up their herds. They are often impatient to get started and think they should not lose any time. Consequently, they often buy animals, because they are available at the time, that even young breeders realize are not of the type or quality that should be used. Such a practice is not economical. Instead of saving time it is a sure way to lose time.

A breeder starting with poorly selected animals is likely to become discouraged and get out of the business just when he should be getting established in it. Plenty of time and attention should be given to the selection of foundation stock. A breeder should first decide definitely what he wants, and then select his animals accordingly.

There is more help available now than ever before in guiding the breeder in selecting breeding stock. Much of the risk in securing breeding stock is eliminated if all known means are used in selecting foundation animals. For example, one of the more recent ways now being used as an indicator of the meat-quality of the animal is *back-fat thickness*.

It is the purpose of this chapter to examine some of the problems in selecting breeding stock. Included also is a consideration of the different breeds of hogs from which breeding stock may be selected. There are a number of new breeds as well as the older established breeds. There are also some important factors in the marketing of pork affecting the choice of breeding stock.

TYPES AND AIMS OF BREEDERS

Swine breeders may be roughly divided into two groups or classes. One group is composed of farmers who breed swine for the purpose of producing market hogs; the other group is made up of growers who breed hogs to be sold as breeding stock.



Fig. 14-1. Judging hogs by appearance in relation to a scorecard. This is not enough for the breeder to know about animals being selected for breeding stock. (Photo by J. K. Coggin)

Market Hog Breeders: The vast majority of breeders belong to the group who are developing commercial herds of hogs for the purpose of producing animals for the market. For the average breeder and farmer this aim is the wiser of the two. To produce market hogs that are capable of developing into high quality animals and that have the ability to make economical gains is a worthy ambition. It is an ambition too few of our southern farmers have today. The sows used in developing a herd of this sort may be grades or purebreds. The purebreds may or may not be registered. To develop a herd of this sort requires a relatively small investment in breeding stock.

Animals from commercial herds do not sell at as high prices as purebred breeding animals. The better commercial herds, however, may be more profitable because the high quality market hogs always sell at a premium. At the same time the cost of growing market hogs is usually not as great as the cost of producing good prospective breeding swine. Since there is a relatively small valuation on the animals for breeding market hogs, the depreciation in value is not so great, and thus the animals can be sold when they are no longer useful as breeders at very little less than their original cost. Commercial swine production



Fig. 14-2. Uniform Lot of Hogs. Good breeding stock helps to insure fast growing and uniform lots of market hogs. The hogs shown in this picture were ready for market at 6 months of age.

will reach its highest development and will be most profitable on those farms that produce in abundance the most economical feed crops, and that carry on sound breeding programs.

Purebred Breeders: This class of breeders is and should be few in number. Only the best breeders and feeders should attempt to keep high class herds for the purpose of supplying breeding stock. They have good judgment in deciding what animals should be mated together to produce the best results. They are able not only to increase the number of good animals in the breed but to produce a few animals that are able to improve the breed as a whole. The outstanding purebred breeders are those who are in a position, because of ability, good judgment and otherwise, to add much to the breed.

The development of outstanding animals in any breed is an accomplishment of which the breeder should be justly proud. The breeder of livestock is working with the laws of nature. He may manipulate these laws so as to develop a mediocre animal or he may develop an outstanding animal of superior worth.

First, the breeder must have a very definite idea in mind as to what he wishes to produce. Through judicial planning, feeding, selecting, and mating, he should be able to travel toward that goal. Some are able to do that much faster than

others. Usually there are a few outstanding breeders who contribute a great deal to the good of the breed as a whole. Before buying a single animal the prospective breeder should decide what his goal in breeding really is. He must not think that he can become a master breeder over-night. Outstanding breeders are not developed in a short time. However, even a young man may well hope to attain such a position some day. To do so he must be content to spend a number of years in getting the necessary training and experience. Training can be secured through classes in vocational agriculture and careful study of latest research in the field of breeding hogs. Experience may be obtained by growing ordinary commercial hogs and from breeding purebred animals of a good useful sort.

FUNDAMENTALS IN DEVELOPING A HERD

The real standard in determining the popularity of any breed of hogs is based on the usefulness of that breed to the man who is producing pork for market. The real test of a breed's efficiency, in other words, is the performance of the hogs in the hands of the hog farmer. No breed can become popular, and no breed can survive, unless it is of the utility type. No breed can or should survive whose standards of selection are based on some fad of color, type, or pedigree rather than on individuality or merit of performance. The ideal of the producer of purebred breeding animals should be based on the ideal of the hog farmer. In turn, the practical desires of the hog grower are determined by the demands of the consumer—the buyer at the meat counter. After all, the purebred breeder is attempting to produce breeding animals that will give the commercial swine grower more profitable hogs than those he is already growing.

Breeding Stock Should Make Rapid Gains: The proficient hog must have capacity for making rapid gains. Rapid gains almost always mean more efficient pork production, both in regard to the cost and to the amount of feed required to produce a pound of pork. Fast gaining pigs are always those that possess strong constitutions and good feeding qualities. Such pigs can be assured by paying strict attention to the size and feeding quality of the boar and sows selected for breeding animals. Quality is an admirable trait in all breeds of animals but it must be combined with enough size and substance to make an economical

animal. In selecting breeding animals for good feeding quality, one should select those gilts that are large for their age and give promise by their type and conformation of developing well at maturity.

Breeding Stock Should Produce Hogs That Top the Market:
Another ideal of the breeder in developing a herd, whether commercial or purebred, is that the hogs possess the ability to top the market when sold. The packers prefer and will buy at top price, hogs that will yield the largest proportion of carcass to live-weight and which are of correct weight and possess the quality demanded by the consumer. The type of finished barrow which will sell at top price is one which is well finished, with a wide and thick back and loin, with deep hams and sides, with smooth and uniform width, with neat smooth head and jowls, and with a trim underline. To produce pigs of this sort they must have sufficient quality and feeding ability to reach "tops" when about six to eight months of age. The sows and boars must be selected with these things in mind. They must possess the proper conformation, smoothness and feeding qualities to produce offsprings of this type.



Fig. 14-3. This breeder has thrifty young stock under good conditions. (Courtesy, Poland China Record Association)

SELECTING BREEDING STOCK

Breeding Stock Should Farrow Large Litters: One of the most important fundamentals in developing a herd of hogs is that the brood sows must be capable of farrowing and weaning large litters of pigs. They must be regular breeders. For the commercial hog producer, prolificacy in sows is probably the most valuable characteristic the breeding animal can have. The farmer should make it a rule to keep in the breeding herd only those sows that have proved by actual performance their ability to produce and raise large litters of pigs. The breeder of purebred animals should most certainly follow this rule. Sometimes it may be rather hard to do so because the breeder might have a sow that in his estimation is very valuable due to her pedigree or some other characteristic, but lacking in the ability to produce large litters.

To insure improvement in size of litters the farmer should select gilts for breeding from large litters only. The ability to produce large litters is an inherited characteristic and much selection and culling is necessary to get that characteristic bred into a herd. The sows which produce large litters, which milk down and become thin during the nursing period, are the kind that transmit prolific breeding qualities to their pigs.

In selecting the boar it is still more important that he be chosen from a large litter. The boar influences more of the pigs in a herd than does any one sow. For that reason, a superior type boar with desirable characteristics will improve the herd more rapidly than any one sow.

WHAT TYPE HOG TO CHOOSE

Many good hog breeders maintain that type is by far more important than breed. There are three distinct types of hogs that are recognized in the United States. They are known as small type, medium type, and large type. There are, of course, all gradations between these types.

The small type hog may be described as one extremely short bodied, low set, thick, and capable of being fattened at an early age though never attaining an extremely large size. The popularity of this type covered the period from about 1895 to 1908.

The intermediate or medium type hogs are longer in both body and legs and lack the thickness of back and early fleshing qualities of the small or chuffy type. Animals of this type were

popular in the show ring from 1915 to 1917. Since 1940 this type has again become popular, as indicated by show winners and otherwise.

The large or range type hogs have bodies and legs of great length as compared with the small type swine. They are leaner and more growthy and possess a strong arched back and carry somewhat more bone than hogs of the two types described above. The rangy type pigs were popular in the show ring from 1925 to 1935.

In recent years attention has centered on the *meat-type hog*. This is a better muscled hog of the medium type producing a large proportion of lean meat and less lard. The newer breeds as well as some of the old lines are concentrating on producing this fast gaining, economical *meat-type hog*.

In selecting the type pig to grow, regardless of the breed, the hog farmer must have in mind the ideal market hog. Of all farm animals, hog types can be changed easiest by the breeder. Any one acquainted with the changes in hog types that have occurred during the past twenty-five years will agree that this ability to change type has been utilized to the fullest extent. The question of what type hog will make the most rapid and economical gains in the feed lots has received much attention from the breeders for several decades.

The question of type as it relates to the desirability of the carcass produced has been given serious consideration by many packers. Unfortunately, most of the arguments for or against the various types have considered the matter from the standpoint of the producer only or from that of the butcher only, while as with most problems in meat production it is necessary to consider it from the standpoint of both producer, butcher and consumer.

Meat-Type Is Best: During the past, the average southern breeder has probably been prone to grow hogs that were of insufficient size and probably tended toward the chuffy type. Hogs of this sort require a smaller amount of maintenance ration and stay in better condition than do the leaner type hogs. In many cases, however, they are not economical in that they are not capable of producing large litters of pigs and are not capable of weaning large pigs at a given age. The extremely meat-type hogs are likely to be capable of producing large litters of pigs and

SHOULDER	MEAT HOG	FAT HOG
	(SQUARE INCHES)	
FAT AREA	19.5	28.1
MUSCLE AREA	91.5	80.6
RATIO FAT TO LEAN	1 to 4.7	1 to 2.9

HAM

FAT AREA	24.2	33.2
MUSCLE AREA	92.7	80.5
RATIO FAT TO LEAN	1 to 3.8	1 to 2.4

LOIN

LEAN AREA	3.53	2.15
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**THE RATH PACKING
COMPANY**

WATERLOO, IA.

Fig. 14-4. Regardless of the breed, look for a meat-type hog. There may be more difference in hogs of the same breed than between breeds. Breeding is the big factor in the difference shown here. (Courtesy, Rath Packing Company, Waterloo, Iowa)

are capable of putting on gains rather fast and more economically than will the fat chuffy pigs.

The intermediate-type hog, often referred to as the meat-type, best suits the great bulk of market demands. Meat-type hogs in general are superior to those of small or large types at weights of 200 to 225 pounds. Small-type hogs at these weights are much too fat, while large-type hogs are not finished and must be carried to weights of 270 to 300 pounds to produce a finished carcass.

WHAT BREED SHALL I CHOOSE?

In a sense it is probably undesirable that we have so many breeds of hogs of the same general type, since many men waste considerable time and effort in attempting to decide which breed is best for their particular conditions. So much more variation exists among the individuals of any breed than among the best or even the average representatives of any two of the breeds that it is almost useless to argue over their respective merits or which breed is best.

Perhaps the best test is neither appearance nor claims, but the record of sales of carcasses from the breed. If these are consistently good, and the breeder from whom the purchase is considered has representative stock, then that should be a "safe buy."

Most men, however, have a distinct preference or liking for a breed and that breed, in all probability, will be the one for him to use. He will likely never be satisfied with any other. That is especially true with the man who has a decided preference and who has the possibilities of developing into an outstanding breeder. There are a few considerations, however, other than personal preference, that should be given special attention in choosing a breed.

Breed Popular in Community: Generally, it is much better to choose a breed predominating in the community. The very fact that the breed is popular in the community is a good indication that it is well suited to the conditions of that locality. The arguments given in favor of community breeding would apply in this case. Several good breeders in a community should be able to do more for themselves and the breed with which they are working than could one individual in the community. There are

many arguments in favor of having one or few breeds in a community and not many arguments in favor of having more.

Little or No Difference in Efficiency of Breeds: Many of the breed associations and many good breeders of purebred hogs like to think that their particular breed is more efficient in pork production than the other breeds. Tests have been carried on by many experiment stations testing the efficiency of one breed as compared to that of another. In almost every instance it was found that there was as much variation among individuals of the same breed as there was among different breeds when efficiency was measured by the rate of gain and the feed required to produce a pound of pork. Generally speaking, one breed can not claim that its average animal will produce a pound of gain with less feed than will the average animal from some other breed. This is especially true with the well established breeds.

In recent years with the demand toward more lean meat and less fat, apparently some breeds are adapting to this change toward a *meat-type hog* more readily than other breeds. Again, this may vary considerably within a breed.

Type Important: When confined to the more important breeds of swine it can generally be said that the type sought by the breeders of the different breeds is about the same. This is not true in every instance, however. In choosing a breed, the farmer should take into consideration the *best market hog for his market and procure the breed that will most nearly produce that type hog*. Correct type is more important than many other things and should be definitely considered in the choice of a breed.

Color of Breed: The color of any breed, whether it be cattle or hogs, should be attractive. At times breed associations have over-emphasized color and many good individuals have been discarded because they were lacking in this respect. One of the things sought after, however, by any hog breeder, whether he be a producer of breeding stock or a grower of meat hogs, is uniformity. Uniformity of color certainly should be considered. Many breeders, however, think it is of little importance as far as market hogs are concerned.

Generally speaking, the various colors of purebred hogs are acceptable to southern breeders. The white hog in some cases has been an exception. In the lower South white hogs may sun-burn and develop skin troubles to a greater extent than hogs of

other colors. This is objectionable and especially so in the extreme lower South where the screwworm fly is present a part or all of the year.

Adaptability of Breed: In choosing a breed the hog farmer should take into consideration the adaptability of the breed to southern conditions. Those breeds that are already being produced in the South in rather large numbers are likely the ones best adapted. A farmer should be rather slow to invest money in a breed that has not been thoroughly tried under southern conditions where both climatic conditions and feeding programs are somewhat different from those found in other sections of the United States. A check with the Animal Husbandry Department at the State Agricultural College should be made before a "new" breed is purchased.

HOW TO SELECT HOGS FOR BREEDING

The first essential in establishing and maintaining a profitable and desirable herd is the intelligent selection of individual animals. Whether hogs are purchased or raised on the farm the problem of selecting the animals for the breeding herd is always present and to a large extent the success of the hog business enterprise depends on the judgment used in the selection. In se-

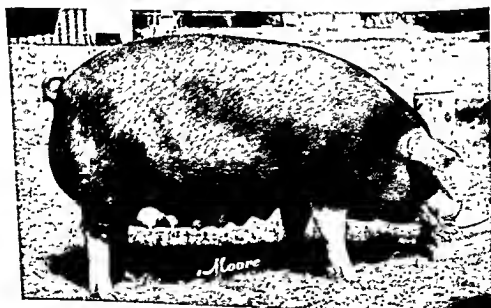


Fig. 14-5. A prize-winning Sow. (Courtesy, Poland China Records Association)

lecting animals for the breeding herd, due consideration should be given to individuality, pedigree, and performance.

Individuality: By individuality is meant everything about the animal which can be seen or judged, such as, size, conformation, feet and legs, breed type features, and the like. Individuality is more generally depended on in estimating the future breeding value of a boar or sow than any other consideration. If the animal is too young to have mature offspring and pedigree or breeding is unknown, individuality is the major consideration available in selection.

All experienced breeders know that the individuality of an animal is an indication of its probable value as a breeder. That is indicated when it is said that "Like Produces Like." If two animals are raised under identical conditions, one a good individual and the other one not, the one with the better individuality almost always proves to be the better producer. The individuality of an animal is determined by its inheritance plus the environment in which it has grown. Proper feeding and care is essential in developing the possibilities of animals.

In the past the efficiency of some breeds has been lowered because the breeders in some cases paid too much attention to non-essential points and often selected animals on those points, ignoring individuality altogether. No matter how attractive the pedigree, if individuality is below standard, the animal should be rejected. A good pedigree is highly desirable only when it is backed up by good individuality.

In selecting animals for breeding purposes it is well to pick those that have the development desired of a fat hog ready for market. This selection can best be made when the animal has reached the age at which fat hogs are marketed. An animal that will not develop into a good market hog is not likely to produce pigs that will grow into good market hogs.

The test of *back-fat thickness* is discussed in another section in this chapter.

The Pedigree: A pedigree is a statement of an animal's ancestors. In addition to the name and herdbook number of each animal, a statement of the date of birth, number of pigs farrowed, number of pigs of each sex raised, and the address of the breeder, are usually given. The complete ancestry of any hog goes back to the beginning of the breed's recorded history. How-

ever, the pedigree, as usually written, includes only the first three or four generations immediately back of the individual.

To estimate the true value of the breeding shown in a pedigree, it is essential that one know something of the individual animals in the pedigree. This knowledge necessarily comes with experience or with study of the breed.

If the immediate parents of an individual have desirable characteristics and the grandparents have a good record of per-



Fig. 14-6. A mature boar showing major characteristics of the breed. (Courtesy, American Berkshire Association)

formance there is reason to think that the pig's pedigree is good. Too often, breeders play up one or two animals in a pig's pedigree back in the third or fourth generation. Individuals that far back in the pedigree are likely not to have had a great deal of influence on the animal in question. It is better that the animals in the pedigree be uniformly good.

In judging the value of a prospective breeding animal the pedigree is a record of the individual's heredity or inheritance. If the breeder knows that this is good then perhaps he should place as much emphasis on pedigree as on individuality. In buying or in selecting breeding animals for the herd one should insist on the combination of good individuality and good pedigree. If

the animal has this combination, there is reason to believe that he will be a satisfactory producer.

Performance: In selecting animals for breeders individuality and pedigree are very important but, probably the real test is actual breeding performance. Brood sows that have proved their ability as breeders should not generally be sacrificed in favor of younger sows. Boars that have proved to be outstanding animals are very valuable. Too often good breeding boars, that have proved their worth, have to be discarded because the owners cannot arrange their breeding program to use them fur-



Fig. 14-7. These Future Farmers are very interested in this champion mature Poland China Boar. (Courtesy, Oklahoma FFA)

ther. Usually other breeders will not purchase such boars because they generally have some age on them and probably have developed certain bad habits. A young breeder will often do well to purchase a proved sire.

The swine breeders in the future will pay more and more attention to record-of-performance in hogs. Tested boars and the offspring from tested boars will and should be the most in demand as breeding animals. The performance back of an individual should in the future be more valuable than show-ring winnings have been in the past.

Several breed associations are developing register-of-merit testing. This is one of the most constructive steps taken by the breed associations. Register-of-merit testing sponsored by the breed associations is exceedingly important and the present breeders who hope to be the outstanding future breeders should participate in this register-of-merit work.

Performance in swine has not had the consideration in the South that it should have had. Too little has been known of the performance of the ancestors of pigs selected for prospective breeders. More and more attention should be given and will be given to the performance of the ancestors of young stock that are about to be selected as prospective breeders.

Back-Fat Thickness: The most recent development in helping the buyer of breeding stock to know in advance the performance of the animals in producing *meat-type* hogs, is testing of *Back-Fat Thickness*. The alert breeder will be interested in this process.

The process is exactly what its name implies—the thickness of fat on the back of the hog. The reason that this is important to know is because the percentage of lean cuts in a carcass is in proportion to the back-fat. That is, the thicker the fat on the back, the lower the percentage of lean cuts of meat.

This particular process has become widely used because it can be used on live hogs without harm to them. Either of two methods can be used to determine the back-fat thickness. One method is to use a thin metal ruler and the other method is to use an electric device. In the first method a small incision is made in the back just back of the shoulders and the fat measured with a small metal ruler for that purpose. The same thing is done over the loins. The electric device has a small needle that goes through the fat and registers. The device works on the principle that

fat does not conduct electricity as well as lean meat. Therefore, the back-fat thickness can be calculated.

These tests for back-fat thickness do no harm to the hog. This is still another process available to the alert breeder in selecting breeding stock for producing the *meat-type* hogs now in demand. The test takes still more of the guessing out of buying breeding stock.

AGE AT WHICH BREEDING STOCK SHOULD BE SECURED

When a young breeder starts out he is confronted with the problem of determining what age breeding hogs he will purchase. Very often lack of finances necessitates his starting in the cheapest way possible. It is usually cheapest to start with pigs that have just been weaned. Selection of prospective breeders at that age, however, has many disadvantages. It is exceedingly difficult to select the best prospective breeder out of a litter of pigs at that age. If pedigree and performance back of the pig are properly evaluated, however, and the pigs are good individuals the breeder should be able to at least pick from a group the best of the pigs available. Too often pigs change considerably in type,

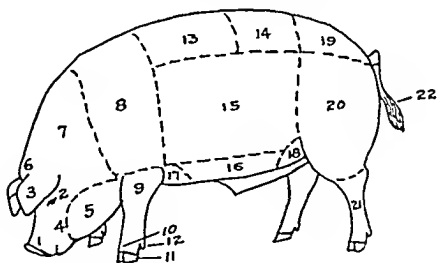


Fig. 14-8. Parts of a Hog. The names of the parts of a hog are as follows:

- | | | | |
|----------|-------------|----------------|----------------|
| 1. Snout | 6. Poll | 12. Dew claw | 18. Hind flank |
| 2. Eye | 7. Neck | 13. Back | 19. Rump |
| 3. Ear | 8. Shoulder | 14. Loin | 20. Ham |
| 4. Cheek | 9. Fore leg | 15. Side | 21. Hind leg |
| 5. Jaw | 10. Pastern | 16. Belly | 22. Tail |
| | 11. Toe | 17. Fore flank | |

conformation and quality during the developing period and when they reach maturity are not as good individuals as they were expected to be.

Age for Selecting Boar: In purchasing animals it is better and safer to purchase as near maturity as possible. The nearer the animal reaches maturity the better picture one has of the animal as a mature hog. In selecting boars, for instance, whether by the owner or the purchaser, it is usually best to select several hogs that have acceptable performance back of them and delay the final selection on individuality as far along towards maturity as possible. It is advisable to castrate during the suckling period the pigs that will be grown out as market hogs. Prospective breeding males can be left and final selections made when the pigs are three to four months old.

Bred Gilts: Generally speaking, the new breeder takes less risk and gets more for his money when he buys bred gilts than if he buys pigs at weaning time. The investment per pig when bought as a bred gilt is much greater but the time until the breeder can realize returns from the animal is much shorter. Bred gilts have reached the stage of maturity that they can be selected very satisfactorily as far as individuality is concerned. Buying bred gilts does away with the necessity of having a breeding boar for a given time. Very often one of the most satisfactory ways for the old established breeder to bring new blood into his herd is by the way of bred gilts or sows. If a gilt proves to be a satisfactory breeder and is good in individuality a breeding boar of this new blood can be introduced into the herd at much less risk than by buying a recently weaned or young pig.

Proved Sows and Boars: The most satisfactory method as far as the breeding phase of the operation is concerned is the purchasing of tried or proved sows and males. Very often a new breeder can purchase sows and males from established breeders that have already demonstrated their real merit. The young breeder takes much less risk when he establishes his breeding operations on these tried and proved animals. Very often, these animals can be purchased at very reasonable sums.

It may prove to be more economical in the long run to purchase sows and boars that have proved their worth as good breeders. They are the best foundation on which a beginner can develop his breeding program. The nearer an animal reaches

maturity the more nearly the breeder is able to properly evaluate that individual as a mature animal.

BREEDS OF SWINE

For many years in the United States there were two distinct classes of hogs: namely, lard type and bacon type. The lard type was by far the most popular in the nation, and especially in the South, where the bacon type was almost unknown. The short, chuffy type of hog was very common in the South known in some sections as the "*Guinea Hog*."

Breeds can no longer be classified as lard type or bacon type. The market demand of the consumer for a meat-type hog has caused most breeders to change the type of animal called "ideal" for the breed. The extent to which each breed has been able to make this change to a meat-type hog can be indicated by a study of the slaughter record and carcass grading of individuals from the different breeds. Again, it should be emphasized that there are great differences within each breed.

Most of our popular breeds of swine have been developed in the United States. All the breeds, however, were partly developed from and greatly influenced by stock brought in from foreign countries. There were no native hogs on the continent when America was discovered. The breeds were developed from stock brought over during early periods of American history and from importations made in the early part of the nineteenth century. The scrub or "razor back" hog that was once common in the south descended from animals brought into America by the early Spanish explorers.

Importation of swine from the European countries and West Africa made during the first half of the nineteenth century furnished the principal stock from which our American breeds originated. China furnished much of the stock found in Europe at that time. The stock imported varied greatly in color and type. Some were white, some red, others black and many were of mixed colors. Some were large and coarse with heavy bones, while others were small and refined. From this mixture the different breeds of hogs were developed. The development was accomplished largely through selection.

Although the hog breeder will probably be interested in only a few breeds in selecting his breeding stock, he will want to know something about the characteristics of all the major breeds.



Fig. 14-9. Hampshire Sow. The sows of this breed usually farrow medium size litters and are good mothers. (Courtesy, Hampshire Swine Registry)

The history of these breeds will also be of interest to many hog breeders. This is particularly true since there have been more new breeds introduced during the past few years than any other similar period of time.

What is it that makes a breed of hogs different from other breeds? The breeder of hogs will want to be able to answer this question. A brief history of some of the older breeds commonly found in the South, together with the main characteristics of each breed will be given. Consideration of all the new breeds will be included because of the widespread interest among hog growers in the South, and the fact that this information is not readily available elsewhere.

The Berkshire Breed: The Berkshire hog originated in England and was introduced in America in 1823. It is still raised in that country. Berkshire is one of the oldest improved breeds of swine. The Berkshire hogs are found in noted herds in the United States.

In color, the breed is similar to the Poland China in that the animals have four white feet, a white spot in the face and a white tail tip. The peculiarity of the Berkshire breed is the short up-turned nose. The face is usually dished and the ears are erect and included slightly forward. Berkshires are medium sized, long bodied hogs showing much smoothness and style. They are average feeders and good grazers.

Table 22. Physical Characteristics of Breeds of Hogs.

<i>Breed</i>	<i>Predominant Color of Hair</i>	<i>Type of Ears</i>	<i>Other Special Features</i>
OLDER BREEDS:			
Berkshire	Black with white feet, face, switch	Erect	Short, dished face
Chester White	White	Drooping	Skin white too
Duroc	Red, from yellow to very dark	Drooping	Formerly Duroc-Jersey
Hampshire	Black with white belt	Erect	Belt circles shoulder and front legs
Hereford	Red with white head, underline, switch	Drooping	Two-thirds must be red
Ohio Improved Chester	White	Drooping	Resembles Chester White
Poland China	Black with white on face, feet, legs and switch	Drooping	Six white points
Spotted Poland China	Black and white spotted	Drooping	Prefer 50-50 color
Tamworth	Red	Erect	Long snout
Yorkshire	White	Erect	Long body
NEW BREEDS:			
Beltsville No. 1	Black with white spots	Drooping	Long body, not much arch in back
Beltsville No. 2	Red, light	Erect	White underline
American Landrace	White	Drooping slightly	Large ears, no arch in back
Maryland No. 1	Black with white spots	Erect	Long head, arch back
Minnesota No. 1	Red	Erect slightly	Long body, no arch
Minnesota No. 2	Black with white spots	Erect slightly	Snout shorter than No. 1
Montana No. 1	Black	Drooping slightly	Long body, no arch
San Pierre	Black and white	Erect	Also called Hamprace
Palouse	White	Erect	Berkshire-like head
			Also called Washington No. 1

Clarence E. Bundy and Ronald V. Diggins, *Swine Production*, Table 6, p. 21. Copyright 1956, by Prentice-Hall, Inc., Englewood Cliffs, N. J. Adapted by permission of the Publisher.

Fig. 14-10

Berkshire hogs have good width of body, ribs well sprung, and the hams and shoulders are generally smooth and well finished. The meat of the breed is good quality. They are frequent winners in carcass contests.

Good Berkshire pigs can be fed to market weight at from five months of age up. Mature boars of the breed, in show condition, usually weigh from 600 to 850 pounds. Mature sows weigh from 450 to 650 pounds. In recent years the Berkshire has been a very popular hog in crossbreeding practices and studies. The breed is well adapted to southern conditions and is one of the popular breeds of the South.

The Chester White Breed: The Chester White Breed originated in Pennsylvania early in the nineteenth century. The large coarse hogs found in the Eastern States at that time were a mixture of the Yorkshire, Lincolnshire and Cheshire hogs all of which were of English origin. In Pennsylvania these hogs were crossed on smaller type hogs. The crossbreed animals were continuously improved up to 1848 when the breed reached such a degree of purity that it could be relied on to produce its desirable qualities. It was originally named "Chester County White" after the county in Pennsylvania in which the breed developed. The word "County" was later dropped from the name.

The Ohio Improved Chester (O. I. C.) was developed in Ohio

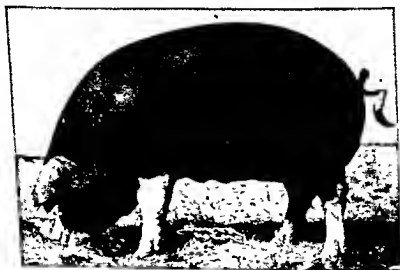


Fig. 14-11. Poland China Sow. This breed is probably found in larger numbers in the South than any other breed. (Courtesy, Poland China Record Association)

by L. B. Silver who is said to have improved his hogs by making careful selections within the breed. The OIC is a separate breed grown extensively in some sections. However, in the South the OIC and the original Chester White are usually thought of as the same breed.

The Chester White is a prolific hog. It matures early, is a good grazer, a good feeder and possesses good dressing qualities. The breed has won more than its share of the honors in the carcass contests at the various livestock shows in the United States. Mature boars of the breed weigh from 500 to 850 pounds and sows weigh from 450 to 700 pounds.

The Chester White, as the name indicates, is a white hog. Due to this color the hog has a tendency to sun-scald in the lower South. This is objectionable and for this reason will likely prevent an excellent breed of hogs from becoming popular in this area.

The Duroc Breed: The Duroc breed originated in the Northeastern section of the United States. It was developed by mating strains of red hogs found in sections of New York and New Jersey. The hogs in New Jersey were originally called Jersey Reds, while those in New York are said to have been developed by a man who owned a noted stallion "Duroc" and people in that vicinity.

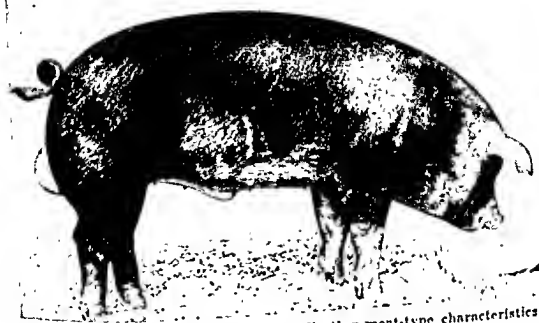


Fig. 14-12. A young Duroc boar indicating meat-type characteristics. (Courtesy, United Duroc Association)

ity called these red hogs Durocs. The breed was known until recently as Duroc Jersey. It is now known as Duroc, the word Jersey being dropped from the name. The Duroc is probably the most popular breed of hogs in the United States. It is very popular in the South. The breed is red in color without a mixture of any other colors. There is some variation in the shade of red but no difference has been found in the feeding or other qualities among the hogs of different shades of color in this breed.

The Duroc is noted for its hardiness and prolificacy. Its popularity has grown until today the breed is widespread throughout the nation.

Several years ago Duroc hogs were criticized for their coarseness. They were thought to carry a great deal of flabby meat about the jowls and underline. During recent years this criticism has been entirely overcome. The modern Duroc shows much trimness and smoothness. The meat of the Duroc is firm and the texture is good. Good individuals of the breed produce excellent carcasses.

Good type pigs of this breed reach a weight of 200 pounds or more at six months of age. The feet and bones of the Duroc hogs generally are good. During former years the type has been rather upstanding but during recent years the type has reached a medium, fairly blocky type animal that makes it very desirable as a market hog. Aged boars, in good breeding condition, weigh from 550 pounds up. Mature sows in show condition weigh from 500 to 800 pounds.

The Hampshire Breed: This breed originated in Hampshire County, England. It was introduced into the United States about 1825. What is now the Hampshire breed of hogs in this country was originally known as the "Thin Rind." In 1835 the "Thin Rind" was introduced into Kentucky from Pennsylvania. In 1893 the American "Thin Rind Record Association" was formed. In 1901 the name was changed to Hampshire and the Association was changed to the Hampshire Swine Record Association.

The color of the Hampshire is black with a white belt entirely encircling the body and including both front legs and feet. Not having the white belt entirely encircling the body is looked upon with disfavor. The white belt must not exceed in width two-thirds of the entire length of the animal. The white belt is a

trade mark; it distinguishes the breed from all other American breeds.

In general appearance the Hampshire is smooth of body, has rather fine bone, and good quality. In type the breed is intermediate between the distinct lard and bacon hog. The carcass contains a large per cent of lean to fat. They have a trimness of middle, refinement of head and smoothness of sides, which qualifies them to produce excellent carcasses. The Hampshire has



Fig. 14-13. A meat-type Hampshire Boar. (Courtesy, Hampshire Swine Registry)

won many carcass contests at the big livestock shows. The breed is medium in size. In past years it was generally thought that Hampshires did not mature to market weight quite as early as hogs of other large type breeds. The breed has improved in this respect in recent years.

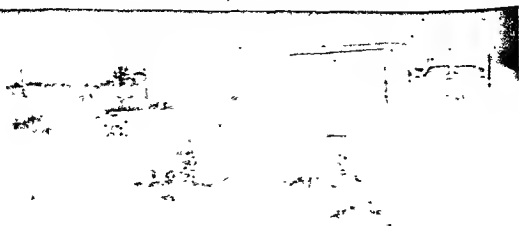
The Hampshire hogs are active and are good grazers. They possess good growing and fattening qualities. Mature boars weigh from 500 to 850 pounds, while mature sows, in show condition, weigh from 500 to 700 pounds. Hampshire sows farrow medium size litters, are good mothers and the sows usually raise a high per cent of the pigs farrowed.



Fig. 14-14. Spotted Poland China Sow. One of the standard requirements as set up by the record association for the breed is that at least 20 per cent of the body be white. (Courtesy, National Spotted Poland China Record)

The Poland China Breed: The Poland China is one of the important breeds of hogs in the United States and is probably found in larger numbers in the South than any other breed. The Poland China hog originated in Butler and Warren Counties, Ohio. The breed undoubtedly was derived from the crossing of several early breeds of hogs. The early hogs carried much more white than does the present day hog. The color of the breed is now black, usually with white feet, nose and tail. Frequently, there are one or more splashes of white on the body. Evidently,

Fig. 14-15. These Poland China pigs are off to a good start. (Courtesy, Poland China Record Association)



Berkshire blood was used in establishing the color and color markings of the Poland China.

The early Poland China was a large, rugged, coarse eared, heavy boned, prolific animal that attained a good market weight but was not of the easy feeding type. During the last part of the nineteenth century and the first part of the twentieth century the type of hog was changed to a short, regular, small, compact bodied hog that was known as the "hot blood." The short, chuffy hog was not a profitable type and made the breed unpopular for a while.

During the last 25 years the Poland China breeders have changed the type materially and have developed it into a large, heavy-boned, rugged animal. Since 1936 the breeders have been breeding what is known as a medium type animal that has the desired body conformation and quality. The Poland China produces a finished carcass at an early age. The sows are fairly prolific and good mothers. The weights of mature animals are about the same as those of the Duroc breed.

The Spotted Poland China Breed: This breed is in many ways very much like the Poland China except there is more white on the body of the Spotted Poland China. One of the standard requirements as set up by the record association for the breed is

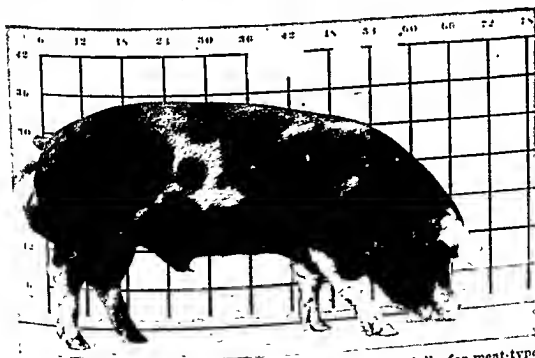


Fig. 14-16. One of the newer breeds developed especially for meat-type hog is the Beltsville No. 1. (Courtesy, Inbred Livestock Registry)

that at least 20 per cent of the body be white. When the earlier breeders of Poland China hogs went to the extreme of selecting small, short, compact hogs, the few breeders demanding more white spots on the animals developed a larger more upstanding type of hog.

The general type found in the breed is a hog with a long, broad back, with good depth of body, with legs of medium length, and with good medium quality bones. The present acceptable type is much like the Poland China except that it is somewhat coarser and has slightly larger bones. Mature boars and sows are not quite as large as the Black Poland China. The Spotted Poland China sows are prolific and raise good size litters. The breed is becoming more popular in the United States and is fast gaining in popularity in the South.

THE NEWER BREEDS

The main characteristics of the newer breeds were listed in Table 22. These are the things noticed about an animal upon sight. However, it should be understood that these newer breeds have not been developed for "looks." Perhaps no breed has ever been developed for appearance only, yet some of the old established breeds have given considerable attention to this factor. The show ring judging of animals has helped to increase emphasis upon this factor too. The research workers who developed the new breeds gave most attention to breeding an animal which will produce a carcass with lots of lean meat and less fat. Such characteristics as color, whether the ears were erect or drooping, and the like were apparently not major considerations. Therefore, the person trained to expect an "ideal animal" with the arched back and the proper color markings, as shown in the pictures of various breeds over the years, will find that most of the newer breeds are less attractive in appearance.

One other factor related to this matter of appearance should be mentioned. This condition would hold for the crossbreds as well as some of the newer breeds. That is, in years past many agricultural leaders in the South have tried to help farmers improve hogs through the use of purebred animals. So much emphasis has been given this matter that usually only purebreds were considered desirable. Therefore, in some sections of the South where farmers are "purebred conscious," there still remains the notion that crossbreds are less desirable on a farm

than purebreds. This may or may not be correct, depending upon many factors.

Apparently, some hog growers in the South have been slow to accept the newer breeds because they differ so markedly in appearance from what has been considered to be the best hogs. For example, at first glance a Minnesota No. 1 boar of excellent quality looks somewhat like a low grade Duroc boar of a few years ago. The same resemblance could be seen in a high quality Landrace boar and a low grade Chester White boar. Such quick judgment in appearance is not reliable in judging a meat-producing animal and should not be depended upon by the breeder selecting his foundation stock. Apparently the hog breeder cannot expect in the future to build a business largely upon the appearance of his hogs. He must produce animals which can put on a high percentage of lean meat economically in a short period of time. Some of the breeders of the older breeds as well as those producing the newer breeds recognize this fact and are developing animals to meet this growing demand.

It is to produce this meat-type hog that the newer breeds have been developed in recent years. Relatively few of these newer breeds are yet available in the South. A few southern breeders have the newer breeds. They are apparently increasing as rapidly as breeding stock is available.

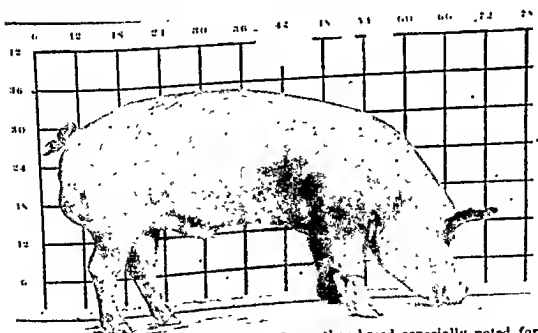


Fig. 14-17. The Beltsville No. 2 is another breed especially noted for its high percentage of lean cuts. (Courtesy, Inbred Livestock Registry)



Fig. 14-18. This Kentucky FFA boy won top honors with his meat-type hog. (Photo, courtesy Kentucky FFA)

The total number of animals registered in the new breeds by 1956 was smaller by far than the number registered in each of several of the older, more popular breeds. However, the influence of the newer breeds on the type of hogs grown in this country has been great for such a short period of time. How rapidly the newer breeds increase in numbers is dependent upon many factors including how rapidly the older breeds adapt to the demand for a *meat-type* hog.

The *Beltsville No. 1* (black and white spotted) and the *Beltsville No. 2* (red with white underline) were developed by the Bureau of Animal Industry, USDA, at the Agricultural Research Center, Beltsville, Maryland. They have been recognized as breeds since 1951 and 1952, respectively. They gain rapidly and dress out well when slaughtered.

Landrace breed was brought to this country from Denmark where it is an established breed. From them was developed the *American Landrace*, recognized as a breed since 1950. They are white and produce a meaty carcass.

Maryland No. 1 was developed by Maryland Agricultural Experiment Station and the USDA and has been recognized officially since 1951. Hogs, of this breed, are black and white spotted, and dress out well with high percentage of lean meat.

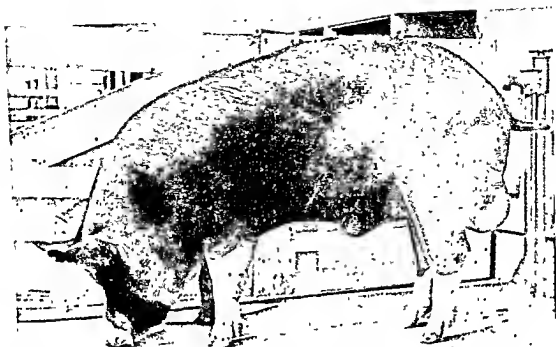


Fig. 14-19. The Maryland No. 1 dresses out with a high percentage of lean meat. (Courtesy, Inbred Livestock Registry)

The *Minnesota No. 1* (red) and *Minnesota No. 2* (black and white) breeds were developed by the Minnesota Agricultural Experiment Station and the USDA Regional Swine Breeding Laboratory. Recognized in 1948, they have long bodies, produce large litters which gain rapidly.

Fig. 14-20. The long body of the Minnesota No. 1 means lean cuts. They have large litters. (Courtesy, Inbred Livestock Registry)





Fig. 14-21. Minnesota No. 2 gains rapidly and yields high percentage of lean pork. (Courtesy, Inbred Livestock Registry)

The *Montana No. 1* breed was developed by the Montana Agricultural Experiment Station and the USDA. The breed has also been known as the *Hamprace* but that name has been dropped officially. They are black, produce very large litters, and the carcass has a high percentage of desirable cuts of lean meat.

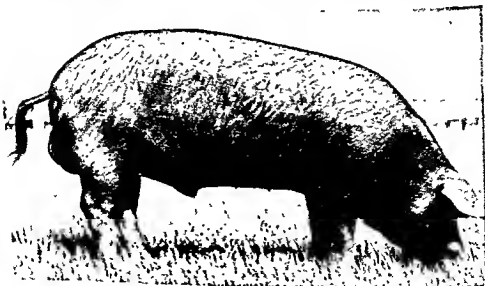


Fig. 14-22. Montana No. 1 is a meat-type hog producing large litters. (Courtesy, Inbred Livestock Registry)



Fig. 14-23. San Pierre was developed to produce high percentage of lean cuts. (Courtesy, Inbred Livestock Registry)

The *San Pierre* breed was developed at the Inbred Swine Farm, San Pierre, Indiana. They are black and white with a dished face resembling the Berkshire.

The *Palouse* breed was developed at Washington State College and is the newest of the breeds recognized (in 1956) by the Inbred Livestock Registry Association. It is a white hog, producing large litters which gain very rapidly.

HYBRID HOGS

Still another new development in the hog breeding business is *Hybrid Hog Production*. As the name indicates, hybrid hogs are produced by careful crossing of certain inbred lines. The process is somewhat complicated. It may be compared with the production of hybrid corn.

Although a rapidly growing business among some hog breeders in the Mid-West, the production of Hybrid Hogs has not gained a foothold in the South.

It should be remembered that just any crossing of breeds of hogs does not produce a true hybrid hog—as discussed here. Again, comparing the process with hybrid corn, just any crossing of breeds will no more produce a true hybrid hog than the crossing of any two varieties of corn will make a valuable hybrid



Fig. 14-24. The Yorkshire is gaining in popularity in some sections of the South. (Courtesy, American Yorkshire Club)



Fig. 14-25. The Tamworth is being grown by more farmers in the South as the trend goes to the meat-type hog. (Courtesy, Tamworth Swine Association)

corn. There must be carefully planned crossing of inbred lines in both cases.

THE BACON BREEDS

As indicated earlier in this chapter, for many years hogs were in two groups: *lard* type or *bacon* type. The *meat-type* hog has replaced this dividing line between the two groups. The two leading bacon breeds were the *Tamworth* and the *Yorkshire*. In the past these breeds were not grown extensively in the South. However, in recent years many more are being grown and they help meet the demand for lean meat. It would be well to consider these two breeds in planning for the type of hogs to use as breeding stock.

SUMMARY

Selecting breeding stock is the most important single decision facing the hog breeder. Not only is this a problem for the hog grower just starting his breeding program, but is also a problem to the experienced breeder each time he selects a gilt or boar to add to his herd. All other decisions, such as feeding practices, may be limited in effectiveness if the hogs lack certain desirable basic characteristics.

However, in selecting animals for breeding stock the breeder has more dependable guides than ever before. In addition to the usual information on pedigree and conformation, there are some newer and more reliable aids in selecting individual animals. Perhaps the two most promising procedures are *progeny-testing* and *back-fat thickness*.

The trend to more *meat-type* hogs has caused changes in some of the older breeds. This demand has also resulted in a number of new breeds of hogs that produce more lean meat and less lard in a carcass.

Generally, it is better for a new breeder to produce the breed of hogs most common in the community. However, this may not always be the case. For example, if other breeders in the community do not recognize an obvious trend in producing pork, such as the demand for more *meat-type* hogs, then the new breeder would do well to consider producing the type of hog to meet the consumer demand.

Again, it is emphasized that there is frequently more difference in individuals within a breed than there is between certain



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Fig. 14-25. The Tamworth is being grown by more farmers in the South as the trend goes to the meat-type hog. (Courtesy, Tamworth Swine Association)

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Again, it is emphasized that there is frequently more difference in individuals within a breed than there is between certain

breeds. Therefore, to decide upon a certain breed for breeding stock is not enough. The alert hog breeder will want to be certain that his foundation breeding stock represents the best he can get in the breed he has chosen.

PROBLEMS AND ACTIVITIES

1. Why do we no longer classify hogs as being either *lard* or *bacon* type?
2. Which breed of hogs do you like best? Why?
3. What are some of the newer breeds of hogs? Why were they named as they were?
4. What has caused the introduction of several breeds of hogs within a few years?
5. List the factors you would consider very important in selecting animals for your breeding stock.
6. Visit a breeder and ask him how he selects hogs for his breeding stock.
7. If you go to your State Fair, see how many breeds of hogs are on exhibit. Could you easily identify each breed?
8. Write to the association headquarters of your favorite breed for more information. Ask about the breed record on recent tests in producing quality carcasses.
9. Check the classified section of *The Progressive Farmer*. What hog breeders in your section advertise hogs for sale?
10. Outline a breeding program for hogs on your farm.

CHAPTER 15

Feeding Breeding Hogs

A good breeding herd is the backbone of a profitable swine enterprise. Without well-developed breeding animals the enterprise will be less profitable or result in a loss. Feed and pasture make up about three-fourths of the cost of a breeding herd. To develop and maintain good breeding stock special attention must be given to feeding them. The number of vigorous healthy pigs farrowed will depend a great deal upon the ration fed the sow. Feeding a good ration to sows during pregnancy is necessary if the hog farmer is to realize the most profit.

It should be clearly understood that feeding bred sows and gilts means allowing for their own nutrition as well as providing for the growth and development of the pigs yet to be born. On the other hand it is not desirable to have the bred sow or gilt to get fat. So, it is extremely important that the hog farmer know what ration and the amounts needed for the proper weight at various times during pregnancy.

This chapter, which is devoted to the job of feeding breeding hogs, is divided into three parts; namely: (1) feeding young gilts and boars, (2) feeding the sow and litter, and (3) feeding the stock boar.

I. FEEDING YOUNG GILTS AND BOARS

Young gilts and boars must be selected from time to time to replace mature stock and in many cases to increase the size of the herd. Many experiments have shown, and some of the outstanding experts agree, that it is best to select breeding hogs from the regular herd two to three weeks prior to the time they are ready for market or slaughter. This is discussed in detail in Chapter 14. When this procedure is followed, the feeding up to the time they are selected for breeding stock, is, of course, the same as that for hogs being fed for slaughter.

The last two to three weeks of the feeding program for slaughter hogs calls for a finishing and fattening ration. On the other hand, gilts and boars selected for breeding require a dif-

ferent ration during this period. They should be fed a ration high in protein.

Adequate minerals should also be provided for breeding hogs. Strong skeleton structure is essential for good breeding hogs. This is possible only when hogs are fed a ration high in minerals. The mineral mixture should be fed either with the protein supplement or fed alone in a self-feeder or mineral box from the time the pigs begin to eat other feeds. The mineral rations suggested in Chapter 9 are adequate for young gilts and boars that have been selected for breeding purposes.

Adequate feeding prior to the time of breeding is also highly desirable. Studies have indicated that a good ration at breeding time will result in more vigorous pigs at farrowing. "Flushing" of sows is discussed in another section of the book.

II. FEEDING THE SOW AND LITTER

The result of the year's work with hogs depends largely on the feeding of the sow during the gestation and suckling periods. The feeding practices during each of these two periods are entirely different. Thus, the feeding program for each period should be planned and done with care.

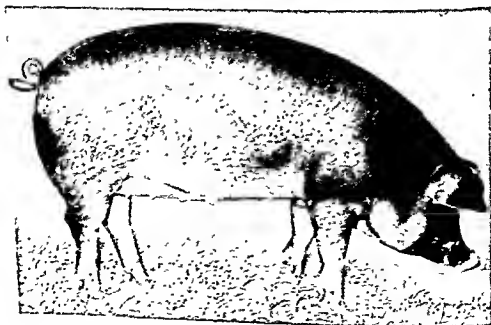


Fig. 15-1. A well-bred gilt. However, good feeding is essential if she is to develop into a good brood sow. (Courtesy, United Duroc Record Association)

1. FEED FOR THE SOW DURING GESTATION PERIOD

One of the most important periods in the life cycle of a pig is before it is born; that is, during the gestation period of the sow. The sow should be fed for two purposes during this time: (1) to maintain her own body; and (2) to develop strong healthy pigs. Proper feeds and ample exercise are the two most important items. The exercise should be provided by a system of feeding that promotes moving about on the part of the sow.

Value of Green Grazing for the Sow During the Gestation Period: The green feed for the sow should be supplied by either

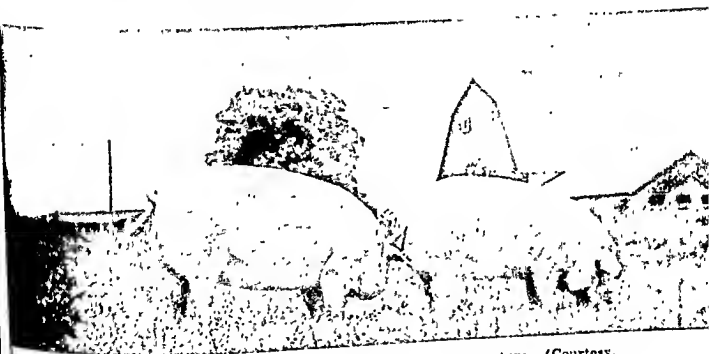


Fig. 15-2. These OIC sows are on Ladino-Fescue pasture. (Courtesy, E. L. Fergusson, Portland, Tennessee)

a permanent pasture or temporary grazing crops. In some sections of the South it is necessary to use a combination of the two in order to provide adequate grazing. Green forage has a laxative effect on the digestive system. This is very desirable during the gestation period of the sow.

Oats or rye mixed with winter legumes are excellent for temporary grazing. Millet and rape are excellent supplements for grazing during certain seasons of the year. Alfalfa meal or ground legume hay should be used to supplement the grazing if there is not available an abundance of green feed.

The Value of Corn and Other Crops for the Sow During the Gestation Period: Corn is the most common and the most important feed used and when fed judiciously with the right combination of protein supplement, green feed, and minerals will produce the best results.

Many experiments have also shown the value of mature oats for the sow during the gestation period. If the grain content of the ration is composed of one-third oats and two-thirds

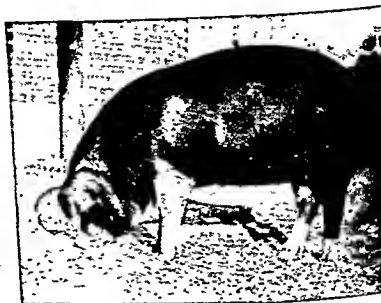


Fig. 15-3. A young gilt. Young stock should be fed a special ration after being selected for breeding purposes. (Courtesy, USDA)

corn by weight it has been found that the average size of the litters, the average weight of each pig, and the percentage of strong pigs are greater than when a ration of corn alone is fed. The feed cost per pig and the average gain of the sow does not seem to be affected by the addition of oats to the ration. Shorts or wheat middling when mixed with corn provide an excellent source of carbohydrates for the sow.

During the gestation period sows can very profitably hog-off mature oats from early May to September. The mature oats furnish grain for the sows and green feed is usually supplied by native growth such as crab grass and weeds that grow in fields.

It is a splendid plan to allow sows during the gestation period to run through the corn and small grain fields after harvesting. Often sufficient grain is secured and ample exercise is provided.

Peanuts and soybeans in sections of the South where they can be grown and hogged-off provide an excellent feed for sows when fed with a small amount of tankage or fish meal and adequate mineral matter. The sow should not be allowed a full ration of these crops during the gestation period. A satisfactory plan is to allow the sow to run in fields that have been partially hogged-off by other hogs. That is, the other hogs are allowed to consume most of the feed and are then transferred to another field. This system of grazing provides for adequate feed when the necessary supplements are provided. It also causes sows to get the necessary exercise due to the amount of ranging they must do to secure the feed.

The Value of Protein Supplement for the Sow During the Gestation Period: Experiments at the Iowa Experiment Station showed that when 10% of the ration of a sow during gestation period was tankage, the litters were 10% larger than those from sows that were fed on corn alone. The pigs were also larger by almost one-third of a pound per pig and there were 30% more strong pigs in the litters. The feed cost per litter and per pig was considerably less than for those fed a ration of corn alone. The average gain per sow during the gestation period was almost twice as much for those fed the tankage ration.

Research at the University of Minnesota suggests that the type of ration fed bred sows or gilts may affect the ability of pigs to resist disease during their early life. Gilts and sows fed a gestation ration containing 14.3% protein weaned 92% of the pigs farrowed while those fed the 10.7% protein ration weaned only 77% in these feeding trials. During lactation, or the suckling period, the ration fed all sows and gilts contained 16.3% protein. The difference in weaning percentage was due principally to a higher death loss from disease among litters from sows fed the low-protein ration. This raises the question of inadequate protein in the diet of bred sows causing pigs to have less resistance to disease.

A more recent Ohio Experiment Station test indicated that sun-cured alfalfa in the breeding ration influenced the number of pigs per litter and survival after birth.

From these and other experiments one would conclude that a protein supplement in the ration of sows produces more pigs per litter, larger pigs, stronger pigs, and produces them at a

less cost than when sows are fed corn alone. Protein supplements also provide for better maintenance of the sow.

Fish meal or meat scraps may be profitably substituted for tankage in the ration. Cottonseed meal, peanut meal and soybean meal may very profitably make up a part of the protein supplement for brood sows during the gestation period.

The Value of Minerals During the Gestation Period: Results of experiment stations show that minerals should be fed to the sow regularly during the gestation period. In the development of young pigs there is a constant drain on the calcium content of the body to supply the skeleton framework of the pigs. Unless minerals high in calcium are supplied, the framework of the pigs will not be strong. In an effort of the sow to supply the necessary calcium, she will draw upon the supply from her own body which will cause her to weaken in the back and pasterns and may bring on serious results. Therefore, to provide strong pigs and to maintain the strength of the sow, it is necessary to provide minerals for the sow during the gestation period.

Tests at the Experiment Stations have shown that the number of pigs per litter was increased considerably by the addition of minerals to the ration. The mineral mixtures suggested in Chapter 9 can be used for feeding pregnant sows. Potassium iodide added to the mineral mixture prevents hairless pigs. Hairless pigs are not prevalent in the South.

Special Feeding Ration for Sow Prior to Farrowing: From two to three weeks before farrowing time the green feed should be increased. Under certain conditions it is advisable to put the sow in a pen, special house or farrowing stall to farrow. The feed at that time should be reduced about one-third.

It is advisable a few days before farrowing time to add a laxative feed such as wheat bran or peanut meal. This may be done while the sow is in the farrowing pen. Even if a sow is not placed in a farrowing pen, but is allowed to have access to grazing up to farrowing time, it is often advisable to add to the ration a laxative feed. Especially is this necessary if the green grazing is limited. The day the sow is expected to farrow, the ration should be further reduced.

Pure water is necessary at all times, but it is very essential for the sow during the farrowing period. If the weather is extremely cold the water should be lukewarm before it is given to the sow.

2. FEED FOR THE SOW DURING THE SUCKLING PERIOD

After a sow has farrowed, the next step is to see that she is properly fed in order that the pigs will be well nourished.

Feeding the Sow During First Week After Farrowing: Feed should not be given to the sow for the first twenty-four hours after farrowing, but she should have all the fresh water that she will drink. During the first week of the suckling period sows are more often overfed than underfed. During the remainder of the suckling period the reverse is usually true. Some experts suggest that the feeding ration for the first seven to ten days should be composed largely of wheat shorts, bran, and forage with very little corn. After this period the corn should be increased and the bran decreased. If other feeds are substituted for these, they should be hand-fed in small quantities for the first week.

The feed should be gradually increased from the first day, reaching full ration at the end of the first week or ten days.

Where green grazing is abundant sows can be fed a limited ration of corn and protein supplement the second day after farrowing. The amount can be increased up to a full feeding on the seventh to tenth day.

Feeding Sows After the First Ten Days of the Suckling Period: The sow nursing a vigorous litter of pigs is a heavy producer of milk and must be well fed in order to prevent a serious drain on her body, and to enable her to provide plenty of milk for the pigs. Milk contains fat, protein, and minerals and therefore, these ingredients must be supplied in the ration. Otherwise the sow will draw on the supply in her own body and consequently become poor and emaciated.

Good results have been obtained with the feeding practices below. The sows are fed corn and a protein supplement twice per day in pens away from the pigs. The protein supplement consists of 6 parts by weight of tankage and 4 parts cottonseed meal. In order to provide for a rapid flow of milk the protein supplement is supplied at the ratio of about one to six. The sows also have access to abundant green grazing during the suckling period. The grazing crops consist of oats, green soybeans, green velvet beans, and millet during the seasons that each of these can be grown.

The following feed was actually consumed at the Georgia




Fig. 15-4. These Yorkshires are on orchard grass and ladino clover pastures. (SCS photo, courtesy of Mrs. Margaret Mitchell, Oxford, N.C.)

Coastal Plain Experiment Station by 12 sows during the suckling period: Corn—3,400 pounds; Protein supplement—599 pounds; Minerals—29 pounds. Abundant green grazing was available during the suckling period.

III. FEEDING THE STOCK BOAR

The old saying that the boar is half the herd is true. The proper feeding and management of the boar will have a great influence on the success of the swine enterprise. The young boar should be given ample green grazing and should be fed enough grain and protein supplement to keep him growing rapidly.

The mature boar should be given abundant green grazing in a permanent or temporary pasture and fed enough grain to keep him in excellent breeding condition. Full feeding of grain causes a boar to get too fat, which is undesirable. The boar should be given ample protein supplement to supply the necessary amount of protein needed to maintain the bodily functions. A 500-pound boar should be fed about one-half pound protein supplement (6 parts tankage and 4 parts cottonseed meal) per day.

Boars should be fed more liberally during the heavy breeding season.

SUMMARY

The most important period in a pig's life is before he is born! The sow should be fed a balanced ration, but varying at different stages of the gestation and lactation period.

Protein and minerals are apparently often neglected in the ration for bred sows. These feed needs not only affect the development of the pig before birth, but some studies indicate that the pig's resistance to disease is affected by the protein and minerals in a sow's ration.

The boar needs a balanced ration too. He should be kept in good condition but not overweight.

Green feed is an important part of the ration for breeding stock. Many hog breeders down South could supply a larger portion of the ration needed by breeding stock by having green grazing available at all times of the year.

The efficient hog grower will plan his feeding program for his breeding stock very carefully for each stage—breeding, gestation, farrowing, and suckling. It should be planned around his own farm situation. Checking these feeding plans with the Hog Specialist at the State Agricultural College might mean better hogs and bigger profits.

PROBLEMS AND ACTIVITIES

1. Compare the feeding program of hogs for breeding with that of hogs for slaughter.
2. What are the essential feeds for sows during the gestation period?
3. Discuss the importance of green grazing, protein supplement, and mineral for the sow during the gestation period.
4. What system of "hogging-off" crops should be used for sows during the gestation period?
5. What special feeding precautions should be given for sows during farrowing time?
6. Discuss feeding the stock boar.
7. Visit a purebred hog breeder. Talk with him about his feeding practices for his breeding stock.
8. Outline a plan for improving the feeding of breeding stock on the home farm.

CHAPTER 16

Caring for the Sow and Litter

If there is any one period of most importance in the hog business, it is at farrowing time. About one-fourth of all pigs farrowed never reach weaning age. Most of these losses occur during the first week. It might be said that the most important period of a pig's life is the first week!

Each pig that is lost during early life reduces the net returns from the litter. Special attention should be given the sow and litter to insure a minimum mortality of young pigs and to get them started growing in a thrifty manner. In addition to the management problems connected with feeding the sow and litter, there are other details of management that should be given consideration. It is the purpose of this chapter to give a basis for dealing with such management problems of the sow and litter.

Caring for the Sow and Pigs at Farrowing Time: It has already been suggested that the sow should be placed in a farrowing pen or house at farrowing time. The pen should be thoroughly clean, dry, and well ventilated. It should be provided with a guard rail around the inside of the pen about 10 inches from the floor and 4 to 6 inches from the sides. This will often prevent the sow from lying on the pigs and crushing them. The University of Tennessee recommends sloping floors with special guards. Farrowing stalls are being built and used by some hog farmers in the South. Recommendations on these stalls should be secured from the State Agricultural College.

Clean House: When the house or pen has been thoroughly cleaned and dried, it should be bedded with clean dry bedding. Wheat or rye straw, chopped hay, or shredded corn fodder are good. The kind of farrowing pen and the amount of bedding to use should be determined by the condition of the weather and the location of the farm. If too little bedding is used the sow will continuously try to collect the bedding in a bunch in order to keep herself and pigs warm, which increases the hazard of crushing young pigs.

Attend Sow: Ordinarily a sow does not need any help when farrowing. If proper preparations have been made no trouble should be expected. However, an attendant should always be at hand while the sow is farrowing to give any needed assistance. When farrowing occurs in very cold weather, a box or basket lined with sacks, with a jug of hot water or warm bricks wrapped in a cloth, placed in the center of the basket or box should be provided. As the pigs arrive, they should be thoroughly dried and placed in the box. An electric pig brooder may be used to advantage. Details of this brooder are given in Chapter 4.



Fig. 16-1. This Vo-Ag student was all prepared for his new litter of pigs. Note guard rails, straw, and clean surroundings. (Courtesy, Mississippi Vo-Ag Education)

Remove "tusches": A pig is born with 8 small tusklike teeth, 4 in each jaw. These should be cut off before the pigs are placed with the sow to nurse. Care should be taken in cutting these teeth not to injure the jaw or gum. Sharp, side cutting pliers should be used. The teeth should be cut about half way between the jaw and the point of the teeth. Do not attempt to break or pull them.

Ear-mark: If records are being kept, ear marking of pigs should be done soon after farrowing.

Feed Milk: It has already been pointed out that the sow should be fed in a separate pen. This is necessary as a part of the internal parasite control program, which is dealt with in Chapter 7. It sometimes happens when the sow farrows that she will not

have any milk. When such occurs the newly farrowed pigs should be fed cow's milk in small quantities at about 2 hour intervals. The milk may be fed with a nipple or by pouring a small quantity into a shallow pan.

Treatment for Diarrhea: Sometimes during the first ten days, the pigs will develop white scours or diarrhea. If this trouble appears, the ration of the sow should be eliminated for a day or two or changed to a small quantity of oats scattered thinly on the floor. Prepare lime water by dissolving a piece of rock lime about the size of a baseball in a gallon of water. After it settles, drain off the water and give it to the sow to drink. Also bathe the sow's udder and teats with some of the lime water. The



Fig. 16-2. The making of a good hog business—if proper feed and management are given. (Photo by J. K. Coggin)

pigs with scours may be given 5 drops of dilute formalin, prepared by mixing 1 ounce of standard strength formalin to 1 pint of water. The feed of the sow should be gradually increased.

Watch for Screwworms: In sections of the South where screwworms are prevalent, care should be exercised to prevent their occurrence in the navel of the pigs and in the sow. Pigs and sow should be kept confined so that the treatment for screwworms can be given in the case of infestation. See Chapter 8 for control measures of screwworms.

Caring for the Sow and Suckling Pigs: The kind of feed and the method of feeding pigs was discussed in the preceding chapter. The sow should be fed in a pen that pigs cannot enter. During the suckling period, the pigs should have a balanced ration

which should be fed in a creep containing a self-feeder. When the pigs are about three weeks old they should have free access to the self-feeder at all times. There should also be a mineral box in the creep.

Weaning the Pigs: There are varied opinions as to the age at which pigs should be weaned. A good brood sow, properly fed, will furnish a good flow of milk until the pigs are from 10 to 12 weeks old. However, tests have shown that pigs can be weaned at 3 weeks if special ration and care are provided. For most hog farmers in the South early weaning of pigs would probably not be practical. It is safe to say that pigs should not be weaned, under normal conditions, until they are at least 8 weeks old.

When sows farrow two litters of pigs per year it is necessary that the pigs be weaned when they are from 8 to 10 weeks old. The desired farrowing date for the succeeding litter will determine to a great extent the length of the lactation period. Sows are usually ready to be bred from three to seven days after the pigs are weaned.

Weaning should begin by reducing the richness of the sows feed 4 or 5 days before weaning. Especially should the protein be reduced. This will tend to reduce the milk flow. The sow and the pigs should then be separated. If the sow's udder becomes too full, they should be placed back together and as soon as the pigs have suckled, they should be separated again.

Castrating Pigs: Castration is the term used for removing the testicles of male pigs. The object of castrating pigs is to promote more rapid growth and a better quality of meat.

When to Castrate Pigs: Boar pigs that are grown for slaughter should be castrated at a very early age; that is, before sexual maturity is reached. The castrated pig or "barrow" will then grow and fatten much more rapidly. It is best to time the castration so that the wound will be completely healed before weaning. Pigs that are castrated from 3 to 6 weeks of age are not usually stunted by the operation. If possible a cool, clear day should be selected for the operation. Damp, cold days should be avoided. Mature boars that are to be fattened for meat should be castrated at least 12 weeks before slaughtering time in order to improve the flavor of the meat.

How to prepare for castrating pigs: The preparation of pigs for castration should be the same as for other surgical opera-

tions. A light diet should be fed for 24 hours preceding castration. For suckling pigs, access to self-feeder should be denied and only the milk from the sow given. The knife or other instruments should be sharp, clean and sterilized before using. For small pigs it is best that two persons be available—one to hold the pig, and one to perform the operation. For a large boar, several persons should be available to hold the boar.

HOW TO CASTRATE PIGS

1. The pig should be placed on his back. One man should place the pig between his feet or knees and hold the pig's hind legs securely with his hands.

2. The scrotum should be washed with soap and water or preferably with a disinfectant solution. Extremely irritating disinfectants should not be used.

3. The testicle on the side farthest from the operator is then held firmly between thumb and fingers of one hand. An incision is then made parallel to the middle line of the body and about one-half inch from it. The incision should not be made too low

Fig. 16-3. Vo-Ag teacher is demonstrating how to castrate a pig. (Photo by J. K. Coggin)



on the scrotum as the pig is held for operation. The incision should be well in the direction of the pig's feet or high on the scrotum as the pig is held. This provides for adequate drainage when the pig is restored to its normal position. Following the incision, the testicle quickly slips out of its membrane. By a slow scraping and twisting process, the attachments are separated with but little bleeding. The other testicle is removed in the same manner.

4. It is unnecessary to dress the wound. It should, however, be washed with a disinfectant solution. In sections where screw-worms are prevalent, pine tar should be placed around the wound, and it should be observed often to see if the wound has become infested. Controlling screwworms is discussed in Chapter 8.

Spaying the Gilts: Spaying gilts is seldom done. It does not promote fattening and there is little if any difference in the meat of spayed and unspayed gilts. Therefore, it should rarely if ever be practiced on the common herd.

Vaccinating Pigs: Pigs should be vaccinated against cholera. See Chapter 6 for details on vaccination.

SUMMARY

The first week is the most important period in a pig's life. About one-fourth of all pigs farrowed die before weaning, most of these deaths are during the first few days.

Places for farrowing may be prepared by use of houses, pens or stalls. The sow should be on a laxative, bulky ration. After farrowing a lighter ration should be fed. Full feed may be resumed by the second week.

Sows should be watched carefully during farrowing, but should be helped only if needed. Needle teeth should be clipped. If records are kept ears should be marked. Some hog farmers make a practice of clipping the navel cord and painting with an appropriate disinfectant.

Additional heat may be needed if the weather is cold. A pig brooder or simply an electric heat lamp can be provided for the pigs.

Pigs should be fed a good pig starter ration, commercial or mixed, highly fortified and about 20% protein. A higher protein ration could be used at first and then reduced toward weaning time.

Pigs can be weaned at a much earlier age than has usually been practiced. Studies show that pigs can be successfully weaned at three weeks of age. However, this takes special feed and care and for most of the hog farmers in the South weaning at 8 to 10 weeks will probably be most desirable.

Pigs should be castrated and vaccinated (for cholera) before weaning. All of these operations should not be done at the same time.

PROBLEMS AND ACTIVITIES

1. What care should be given sows and pigs at farrowing time?
2. When should pigs be weaned?
3. When should pigs be castrated?
4. Discuss the steps in castrating pigs.
5. Visit a farm that has the proper facilities for caring for sow at farrowing time.
6. Visit a farm and practice the skills of castrating pigs.
7. Figure the approximate cost of each pig lost before weaning.
8. List some changes that need to be made on the home farm to improve the care of sow and litter.

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Agricultural Research. Monthly publication by Agricultural Research Service, USDA. Most issues have articles on new research on hogs;
Agricultural Situation. Monthly publication frequently gives outlook information as well as current facts on the hog situation;
Agricultural Marketing Service. A number of publications relating to marketing hogs;
Farmers Bulletins. Several bulletins of interest such as F.B. 1263, "Breeds of Swine";
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APPENDIX

BREED ASSOCIATIONS

Headquarters for records of most of the purebred registered hogs in the South.

American Berkshire Association, 601 W. Monroe Street, Springfield, Illinois

American Landrace Association, Inc., Noblesville, Indiana

American Yorkshire Club, Inc., Wallace Building, Lafayette, Indiana

Chester White Swine Record Association, Rochester, Indiana

Hampshire Swine Registry, 915 Commercial National Bank Building, Peoria 2, Illinois

Inbred Livestock Registry Association, 4995 Excelsior Blvd., Louis Park, Minn.

National Spotted Poland China Record, 8180 Rosemeade Lane, Indianapolis 8, Indiana

OIC Swine Breeders' Association, Goshen, Indiana

Poland China Record Association, Galesburg, Illinois

Tamworth Swine Association, Hagerstown, Indiana

United Duroc Record Association, 237-9 North Monroe, Peoria 3, Illinois

SOME OF THE BREED MAGAZINES

American Hampshire Herdsman, Peoria, Illinois

Berkshire News, Springfield, Illinois

Chester White Journal, Rochester, Indiana

Chester White World, Des Moines, Iowa

Duroc News, Peoria, Illinois

Hog Breeder, 313 Jefferson Building, Peoria 2, Illinois

O.I.C. News, Goshen, Indiana

Poland China Breeder, Maryville, Missouri

Poland China World, Galesburg, Illinois

Swine World, Webster City, Iowa

The Spotted Poland China Bulletin, Indianapolis, Indiana

AGRICULTURAL COLLEGES

<i>Alabama</i>	Alabama Polytechnic Institute	Auburn
<i>Arizona</i>	University of Arizona	Tucson
<i>Arkansas</i>	University of Arkansas	Fayetteville
<i>California</i>	University of California	Berkeley
<i>Colorado</i>	College of Agriculture	Fort Collins
<i>Connecticut</i>	University of Connecticut	Storrs
<i>Delaware</i>	University of Delaware	Newark
<i>Florida</i>	University of Florida	Gainesville
<i>Georgia</i>	University of Georgia	Athens
<i>Idaho</i>	University of Idaho	Moscow
<i>Illinois</i>	University of Illinois	Urbana
<i>Indiana</i>	Purdue University	Lafayette
<i>Iowa</i>	Iowa State College	Ames
<i>Kansas</i>	Kansas State College	Manhattan
<i>Kentucky</i>	University of Kentucky	Lexington
<i>Louisiana</i>	Louisiana State University	Baton Rouge
<i>Maine</i>	University of Maine	Orono
<i>Maryland</i>	University of Maryland	College Park
<i>Massachusetts</i>	Massachusetts State College	Amherst
<i>Michigan</i>	Michigan State College	East Lansing
<i>Minnesota</i>	University of Minnesota	St. Paul
<i>Mississippi</i>	Mississippi State College	Starkville
<i>Missouri</i>	University of Missouri	Columbia
<i>Montana</i>	Montana State College	Bozeman
<i>Nebraska</i>	University of Nebraska	Lincoln
<i>Nevada</i>	University of Nevada	Reno
<i>New Hampshire</i>	University of New Hampshire	Durham
<i>New Jersey</i>	Rutgers University	New Brunswick
<i>New Mexico</i>	New Mexico College of Agriculture	State College
<i>New York</i>	Cornell University	Ithaca
<i>North Carolina</i>	North Carolina State College	Raleigh
<i>North Dakota</i>	North Dakota Agricultural College	Fargo

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<i>Ohio</i>	Ohio State University	Columbus
<i>Oklahoma</i>	Oklahoma State University	Stillwater
<i>Oregon</i>	Oregon State College	Corvallis
<i>Pennsylvania</i>	Pennsylvania State University	University Park
<i>Rhode Island</i>	Rhode Island State College	Kingston
<i>South Carolina</i>	Clemson College	Clemson
<i>South Dakota</i>	South Dakota State College	Brookings
<i>Tennessee</i>	University of Tennessee	Knoxville
<i>Texas</i>	Texas A. and M. College	College Station
<i>Utah</i>	Utah State Agricultural College	Logan
<i>Vermont</i>	University of Vermont	Burlington
<i>Virginia</i>	Virginia Polytechnic Institute	Blacksburg
<i>Washington</i>	State College of Washington	Pullman
<i>West Virginia</i>	West Virginia University	Morgantown
<i>Wisconsin</i>	University of Wisconsin	Madison
<i>Wyoming</i>	University of Wyoming	Laramie

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